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✦ ✦ ✦

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✦ ✦ ✦

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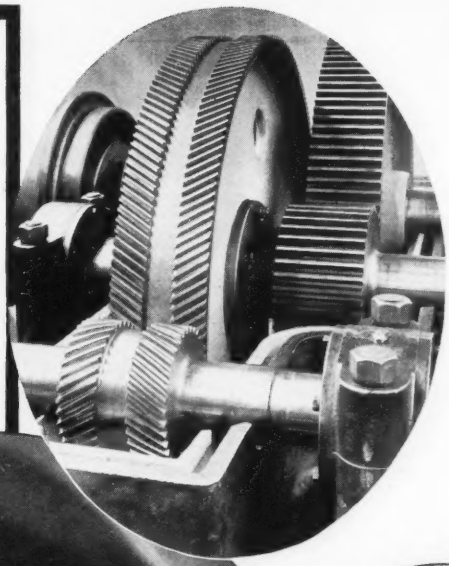

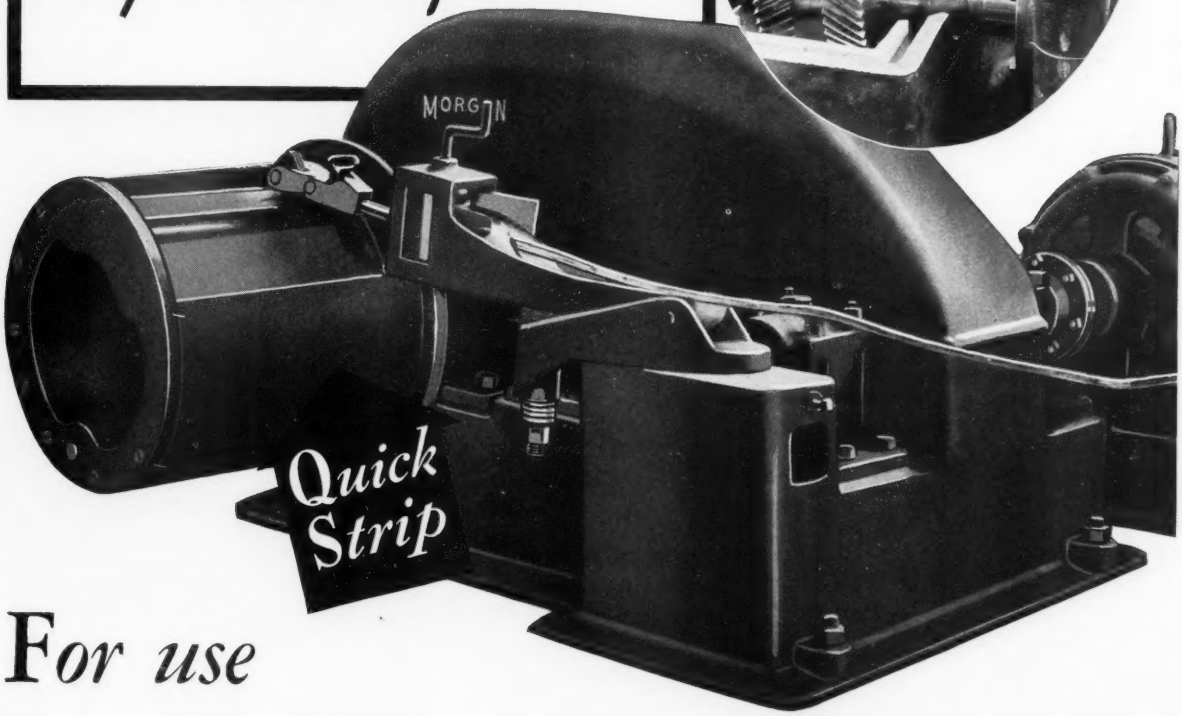

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Shaft Bearings: Roller type throughout.

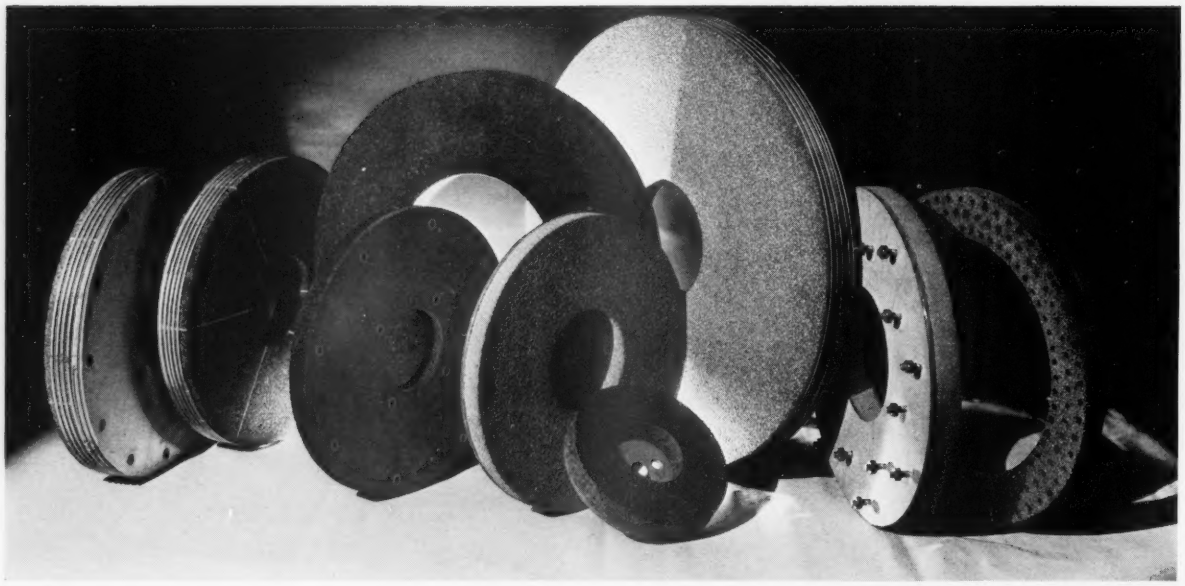
Motor: Adjustable speed D. C. or constant speed A. C.

Floor Space: 8 x 13 ft. for machine and motor.

W19

MORGAN *Wire Drawing Machines*

WIRE & WIRE PRODUCTS, Vol 12, No. 8, August, 1937. Executive office, 17 East 42nd St., New York, N. Y. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secretary and Treasurer. Publication office, 13 West Church Street, Washington, N. J. Subscription price: U. S., $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign, $7.50 per year. Entered as second class mail at the Post Office, Washington, N. J., under Act of March, 1879.



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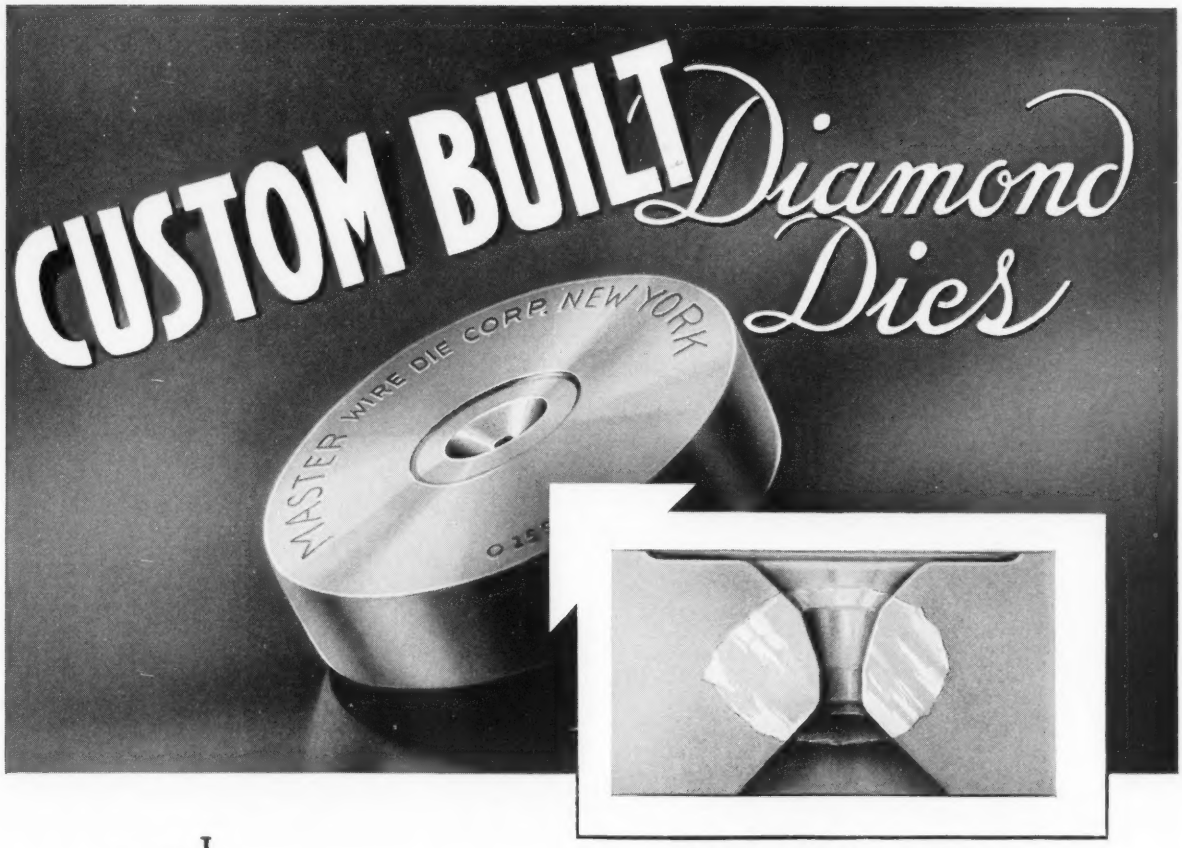

ENLARGED CROSS SECTION

Diamond Dies are now obtainable with Tungsten Carbide Die features. Definite angle and length of bearing insures greater die life and uniformity of die shape.

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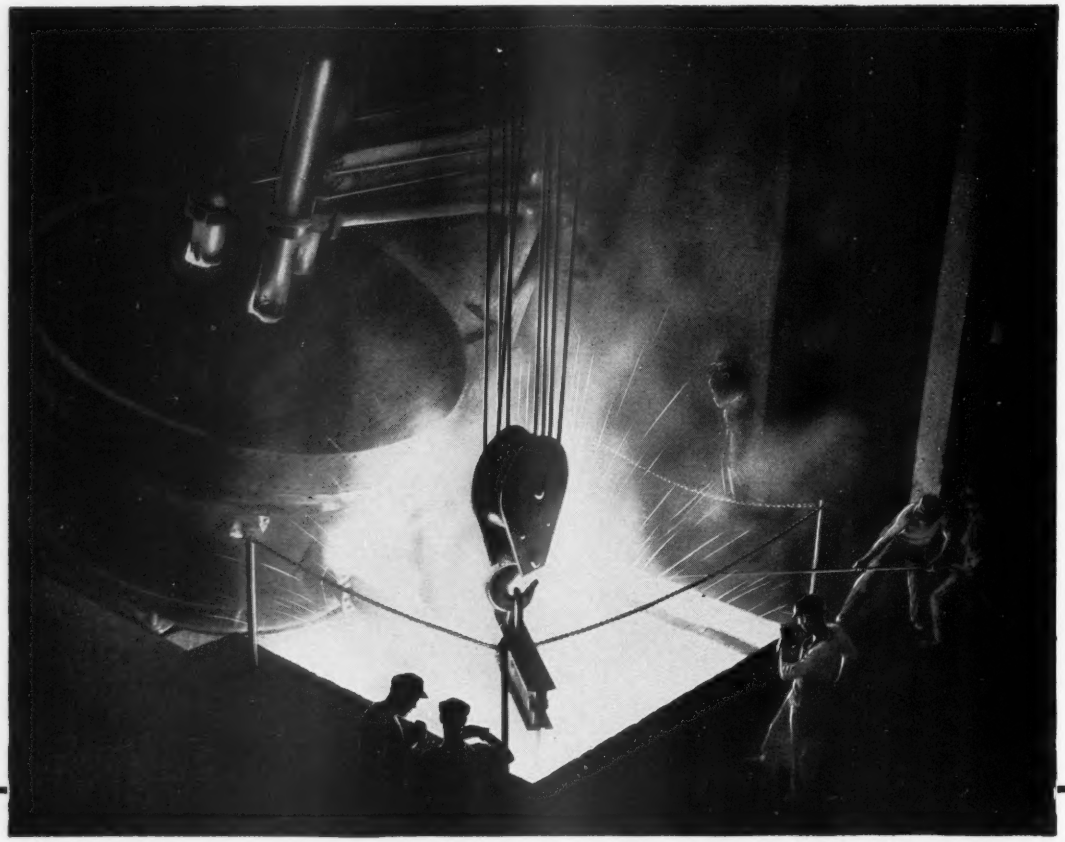

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★To maintain established standards of quality and service to a constantly increasing number of customers, Rustless Iron and Steel Corporation is completing a plant expansion program that will double previous capacity.

★Rustless Metallurgists and Engineers will gladly advise the alloy best suited to your needs. Bar and wire products in all commercial finishes and a variety of grades are available for prompt shipment.

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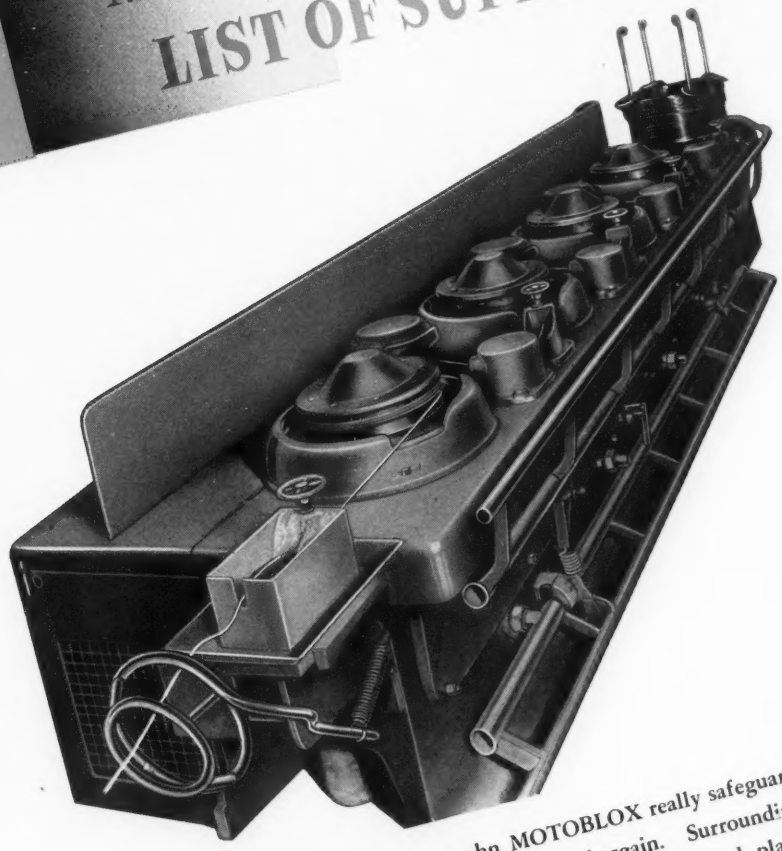

So far as is humanly possible, the Vaughn MOTOBLOX really safeguards the worker—and, of course, your corporate pocketbook into the bargain. Surrounding each machine are correctly placed levers and hinged plates that instantly shut down operation when in contact with the attendant's hand or body. Snarls ahead of the entering die automatically halt the machine before entry is gained, and a stop on the finishing block cuts off power when wire breaks or an end runs out.

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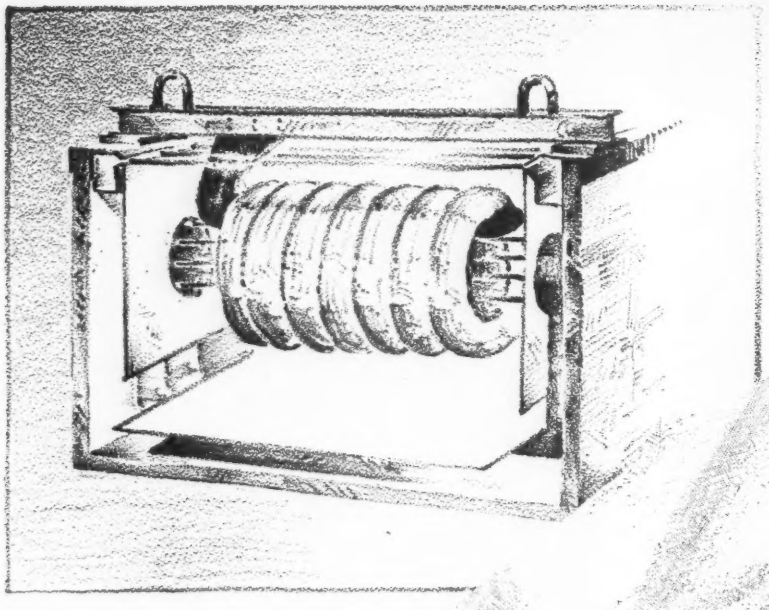

● From a slow, special process, rod baking has now progressed to become a part of the continuous cleaning procedure. Literally, this consists of quickly immersing the rod into a tank of hot air. Results: Fuel consumption running from 75,000 to 100,000 B. T. U. per ton of rod; absolutely uniform drying throughout the coil; vital space savings; most important of all are findings from time-tests showing the recovery from acid brittleness to be practically complete on a range of wire from low carbon basic to high carbon spring and rope wire.

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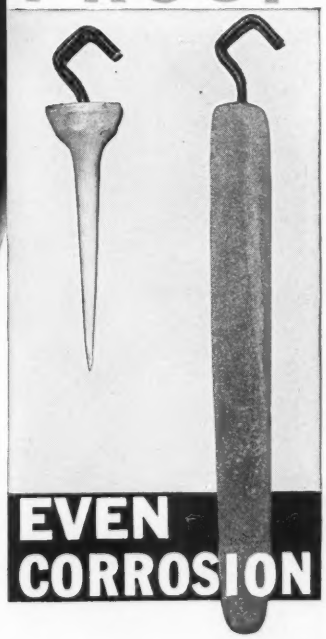

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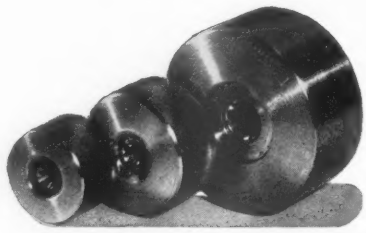

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Our interests in the cemented carbide die field of the United States and Canada have been combined with those of the Carboloy Company.

Unwidies, both diamond and cemented carbide have long been the standard of the wire drawing industry.
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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip Wire Products and Insulated Wire and Cable

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 12 AUGUST, 1937 No. 8

Designated as

Official Publication By The Wire Association

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A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING--- EXTRUDING --- FORMING --- FABRICATING

Vol. 12 AUGUST, 1937 No. 8

New Continuous Rod Mills American Steel & Wire Co.

at Joliet, Illinois

A description of the new continuous rod mills recently completed at Joliet, Illinois together with an outline of the technical details of production in sequence. ✦ ✦

HIGH quality, low production costs and maximum output were the objectives set by the **American Steel & Wire Company** in building the two parallel continuous rod mills which are now completely installed and are being operated at Joliet. These mills, designed by the Wire Company's own engineers, embody all modern improvements and a number of new developments never before used in rod mills.

✦ ✦ ✦

THE new mill was dedicated June 23rd by prominent officials of the United States Steel Corporation and its Subsidiary, American Steel & Wire Company. **C. F. Blackmer,** president and **C. F. Hood,** Executive Vice-President of the Wire Company were hosts to a group of leading business men and railroad officials from Chicago and Joliet on a tour of inspection through the new mills, following a luncheon with the Association of Commerce of Joliet. Heading the delegation from New York was **Ralph H. Watson,** Vice-President of the United States Steel Corporation, who along with **Mr. Blackmer** made the principal addresses at the local luncheon. ✦ ✦ ✦

AT the luncheon celebrating their opening was an old-timers' club. Seated at the table were 10 men each of whom has spent 50 years or more in the steel industry. Their combined service amounts to 520 years and 8 months. One with almost the longest service, 52 years and 7 months, is still working. The others are pensioned.

Their names and service records are as follows:

Timothy Sullivan—51 yrs., 10 mo.
Alfred Atkinson—53 yrs.
Anton Scheffler—57 yrs., 3 mo.
Cornelius Dillon—50 yrs., 1 mo.
E. Harry Jones—50 yrs., 5 mo.
Thomas Perkins—50 yrs., 3 mos.
John Webb—50 yrs.
Wm. Isaac—52 yrs., 4 mo.
Frank Berscheid—52 yrs., 11 mo.
Otto Schaller—52 yrs., 7 mo.

✦ ✦ ✦

A TOTAL of $5,000,000 is being expended on a program of improvement and modernization in the Chicago district. Approximately $3,000,000 of this has gone into the rod mills with the remainder expended for improvements in the billet and wire mills.

✦ ✦ ✦

THESE new rod mills are an important factor in this program of im-

Fig. 1. Billet yards showing the unique manner of dividing into compartments by vertical beams. Each compartment has a capacity of about three carloads of billets. Total capacity of the yard is 20,000 tons. Crane is seen placing lift of billets into storage compartment. Billets are loaded in South Chicago and Gary on skids so as to allow room to slip chains underneath a lift in the billet yards at Joliet. ✦ ✦ ✦

Designated as Official Publication by the Wire Association

provement which begins at the South Chicago and Gary billet mills and is being carried on through to the wire mills of the American Steel & Wire Company located in Illinois. In order to obtain the right kind of raw materials entering the rod mills it was necessary to improve the billet rolling to get billets more accurate as to dimensions and more uniform as to physical properties. The important achievement of this new rod mill is to give more efficiency in the wire mills. The longer lengths will reduce the amount of butt-welding of one rod to another in order to achieve continuous drawing and thus save time in wire drawing. Ultimately, it will mean to the public a wire of higher quality as a result of better uniformity in hardness, grain size, and analysis.

Fig. 2. Billet table, showing billets rolling towards approach table.

✦ ✦ ✦

Size And Capacity

THE rod mill buildings consist of two parallel bays 140 ft. wide by 408 ft. long with a 70 ft. wide hook conveyor building located parallel to the rod mill buildings.

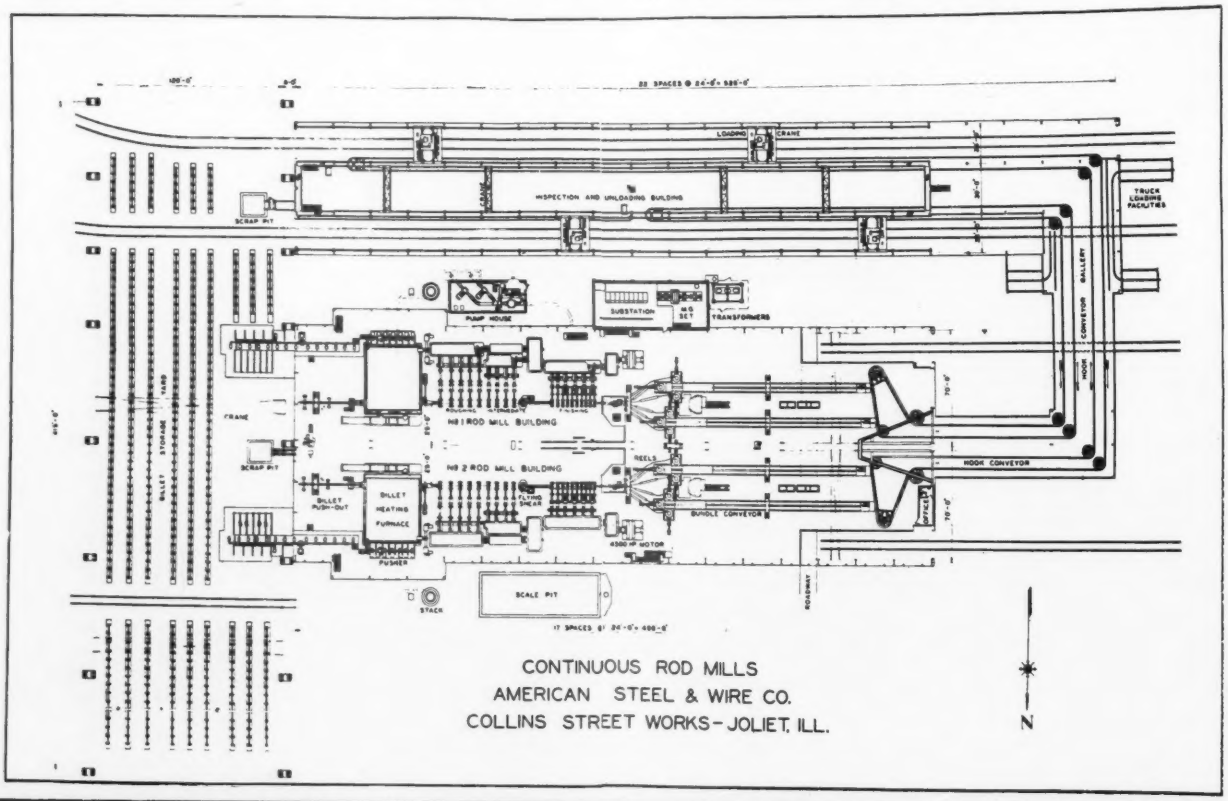
✦ ✦ ✦

THE rod mills are capable of rolling the heaviest single bundle of No. 5 rod in the world. Although 600 lb. bundles, 5,000 ft. long, can be rolled by these mills, the regular bundle will weigh about 550 lbs. and measure 4,375 ft. The two Joliet mills will have a combined capacity of 220,000 tons per year.

Technical Details In Sequence

Billets

IN the blooming mill, a 10,000 lb. ingot, 7 ft. long by 27 in. square is rolled to a bloom 7 in. square which is cut into two or three pieces. The bloom is then rolled in the billet mill, reduced from 7 in. square to $2\frac{5}{16}$ in. Standard length of billet is 30 ft. and weight varies according to cross section, ranging from 2 in. square (400 lb.) to $2\frac{5}{16}$ in. square (500 lb. to 540 lb.) Billets are rolled in the rod mill to a diameter of .207 in. to get No. 5 rod, the economic happy medium of hot rolling to a size for cold drawing. The new continuous rod mills can roll from No. 5 rod up to a size of .5 in. diameter. Basic steel billets are supplied from Gary Works and Bessemer billets from South Chicago Works of the Carnegie-Illinois Steel Corporation and shipped over the Joliet & Elgin Railroad to Joliet.



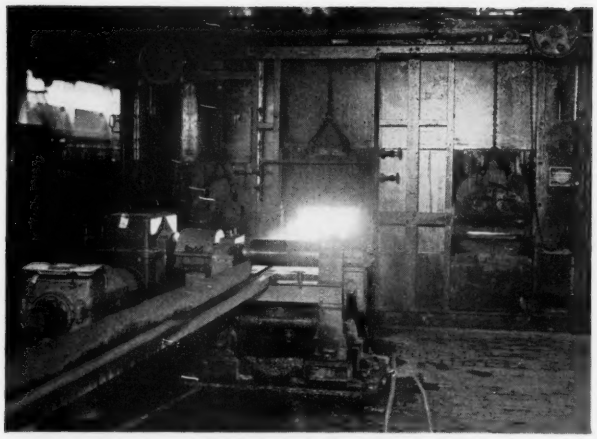


Fig. 3. Billet push out machine shoving a billet through the furnace into one of the new continuous rod mills of the American Steel & Wire Company, at Joliet, Illinois. Billet leaves furnace on the other side and enters first stand of the roughing train. The furnace has a hearth 32 ft. long and 34 ft. wide and carries a temperature in excess of 2000 degrees F. ✦

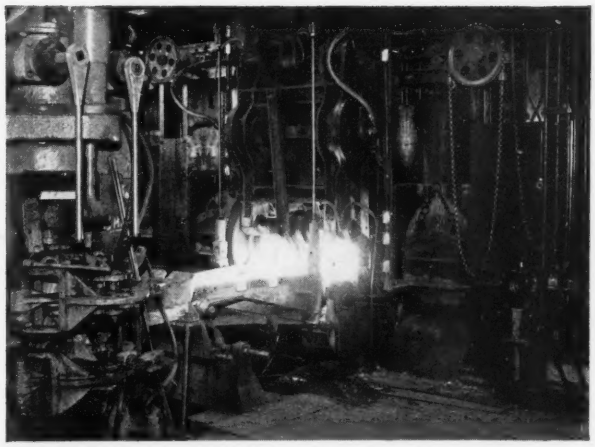


Fig. 4. Billet as it leaves the furnace and enters the first roughing stand. The billets are 2 $\frac{1}{16}$ in. square 30 ft. long. The mills are both of two strands each, so that a pair of billets will pass through each mill simultaneously.

Billet Yard

THE billet yard is divided into a series of compartments, each having a capacity of about three carloads of billets, or a total capacity for the yard of approximately 20,000 tons. The compartments are numbered and a record of the stock in each is kept, so that the crane operator can be instructed to take billets out of a certain pile, according to whatever stock is required.

✦ ✦ ✦

THE yard is covered by a 415 ft. crane runway having a span of 120 ft., and is served by two 15-ton capacity cranes for unloading billets from the cars to storage. On arrival at the Joliet plant the billets are unloaded and placed in the racks, so arranged that all the billets of similar chemical composition are segregated and there is no danger of mixup in taking billets from stock to feed to the furnace. The billets are classified as to chemical composition, inasmuch as the physical and chemical characteristics of finished rods must vary to meet the requirements of the trade for various kinds of wire, such as telegraph wire, fence wire, etc. Billets are placed on two skid platforms and rolled onto the furnace approach tables, one by one.

✦ ✦ ✦

Furnaces

AFTER each billet is pushed into the furnace, long arms come in from the side of the furnace and push the whole row of billets towards the hot end of the furnace. In this way a gradual feed of billets from the cold end towards the discharge end is maintained. Full automatic temperature control is secured by means of pyrometers connected to temperature recording instruments and the fuel control apparatus. The furnaces have a hearth approximately 32 ft. long and 34 ft. wide, and are heated by coke oven gas from the Carnegie-Illinois coke plant. The furnace, however, is so designed that at any time either natural gas or oil can be used for fuel. At the discharge end of the furnace the billets reach a temperature of over 2000° F., and are pushed from the

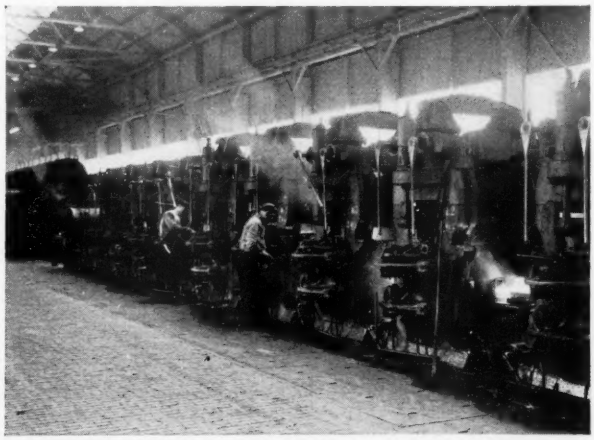


Fig. 5. General view of one of the continuous rod mills, showing the roughing stands, the intermediate stands, the flying shear and the finishing stands. There are 19 stands in all, completely equipped throughout with anti-friction bearings, the first time this has been done in rod mill construction. ✦ ✦ ✦ ✦ ✦ ✦

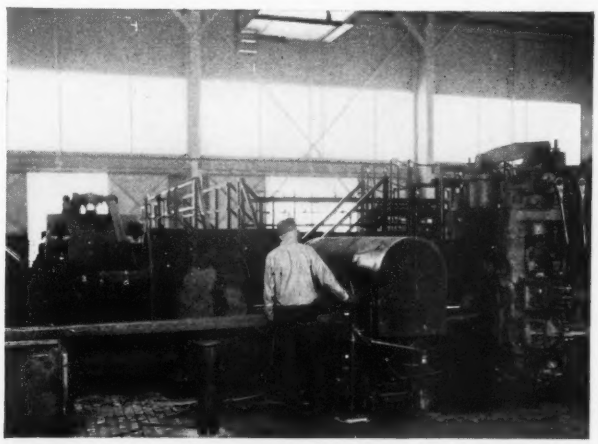


Fig. 6. View of the flying shear located between the intermediate and finishing stands. Here the operator cuts off the burred end to prevent cobbling. A pile of burred ends is seen below the trough. This flying shear was invented and patented by American Steel & Wire Company's engineers. ✦

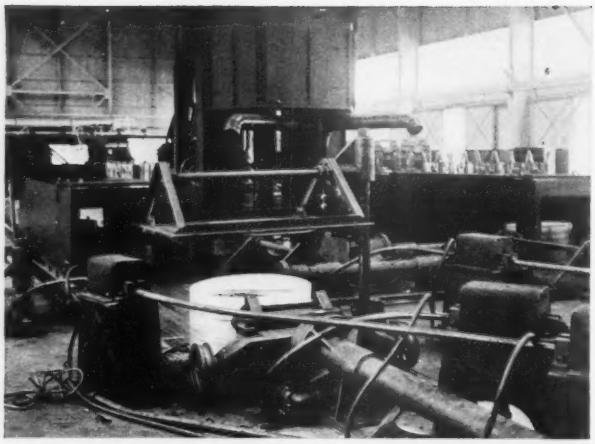


Fig. 7. Bundle of rods about to be pushed from the reel onto the drag conveyor. Each reel as it is being wound is several feet below the floor. It is raised to the level of the drag conveyor by an elevator.

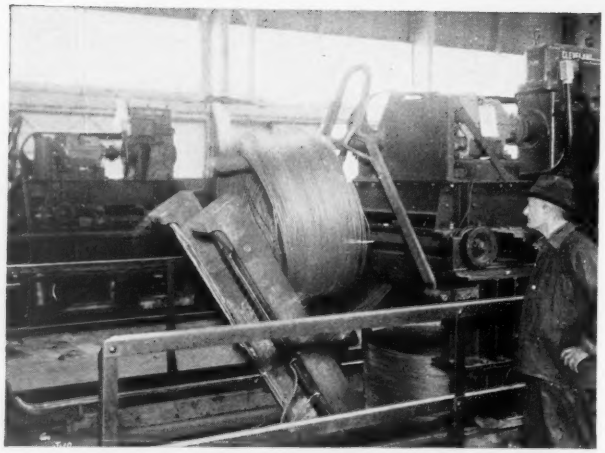


Fig. 8. Transfer machine taking bundle of rod from drag conveyor. Transfer machine next places bundle on Hook Conveyor.

furnace directly into the first roll of the continuous mill.

✦ ✦ ✦

Mills

THE two 19-stand continuous mills are built in parallel lines in the building at an elevation of approximately 14 ft. above ground level, which may appear unusual in mill construction. The reason for doing this is because the drainage conditions are such that if the mills were located on the ground level, as is usual, it would be necessary to pump all the water, containing scale, etc., to an elevation so that it could enter the existing sewers, the level of which was fixed by local conditions.

✦ ✦ ✦

EACH of the two mills, which are the first completely anti-friction bearing equipped rod mills ever built, consists of five 15″ stands and four 13″ stands, comprising roughing train, followed by steam powered flying shear for cropping the front end of the bar, and then ten 11″ stands comprising the finishing train.

✦ ✦ ✦

INSTEAD of changing the rolls in this mill provision is made for replacing complete stands in the finishing group. This operation can be done in less than half an hour and a full set of duplicate stands has been provided.

✦ ✦ ✦

THE billets are fed to each mill in staggered pairs. Starting with a $2\frac{5}{16}$ in. square billet at #1 stand when rolling #5 rods, the pieces are successively reduced and leave the 19th stand with a diameter of .207″ and a length of 4375 ft. Total production from the two, 2-line mills, is 13,712 ft. of rod per minute.

✦ ✦ ✦

Rolling

THROUGHOUT the rolling, the billet changes alternately from square to oval at each different pass. After the oval pass, a twist guide turns it 90 degrees before entering the next square pass. After the square pass the billet turns only 45 degrees. This twisting between passes continues until the last pass, which is round. Maximum reduction in diameter by any pass is 35% and the minimum of 9% is at the last pass.

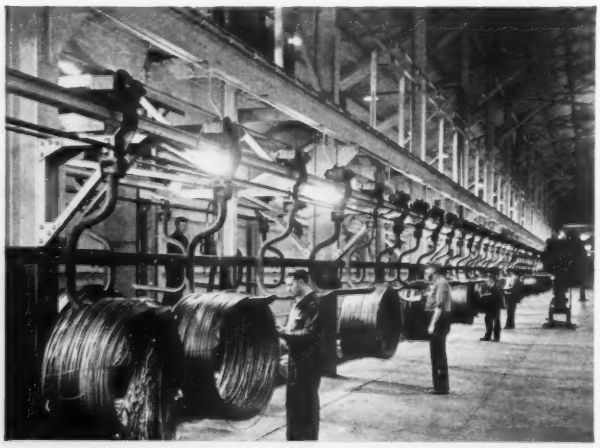


Fig. 9. The inspection platform. By the time the bundles have reached this location, they have had time to cool down to air temperature. Here they are inspected for shape and surface before loading into cars for shipment to the wire mills.

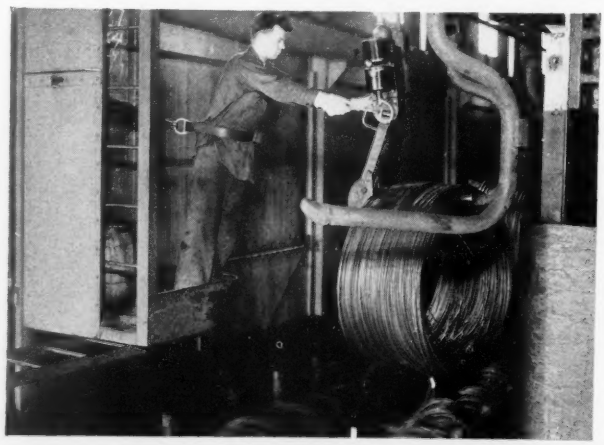


Fig. 10. Airplane crane removing bundle of rods from a hook conveyor for loading into freight cars. Note safety belt around operator's waist.

Speed Of Rolling

ROLLING speed varies from 8.38 r.p.m. at the first roughing pass to 1126.45 r.p.m., or 3928 ft. per minute for the last pass in the finishing mill. A billet advances through all 19 passes in 75 seconds. With two billets passing through each of the two mills simultaneously, one billet is actually rolled every 40 seconds. In the old Joliet mills abandoned as obsolete in 1931, rolling speed was 1,500 ft, per minute. By speedy rolling rods can be made better because the drop in temperature between the front and rear end of the rod is practically eliminated. In the past the drop was sometimes as much as 500° F., and by the time the rear end of a rod reached the last pass, it had cooled to such an extent as to interfere seriously with accuracy of gauge, contour and uniformity. As a result, the rods would often vary from the front to the rear. The higher quality of rod obtained in these new mills assures a better quality of finished wire, providing greater safety in all types of uses, as for example in bridge and elevator cables, etc.

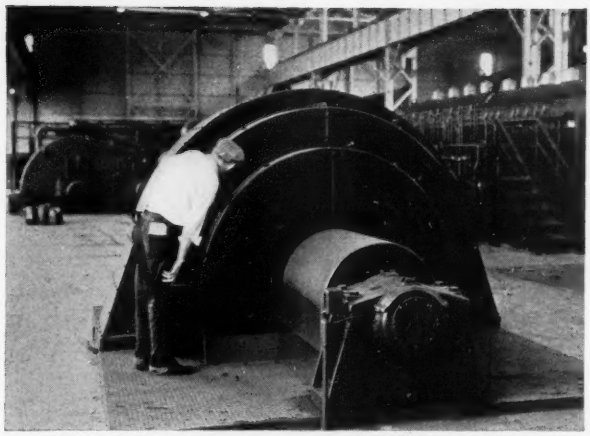


Fig. 11. The electric motor which supplies the power for all of the rolls in one of the mills. This 4,500 H.P. motor drives all of the rolls of the 19 passes in each double strand mill.

✦ ✦ ✦

Bearings And Gears

THIS new mill is the first to be equipped throughout with anti-friction bearings. The stands are equipped with tapered roller bearing with special provision for adjustment of the rolls vertically, horizontally and longitudinally, which permits lining up of the passes accurately. In order to keep the mill in line it is equipped with universal spindles throughout instead of the usual wabblers. All the pinions of the roughing mill have herringbone teeth. Pinions in the finishing mill, together with their speed-up gears, which are arranged in the same case, have single helical teeth. The bevel gear drives are spiral and gear reduction sets have herringbone gears. This construction has greatly reduced the noise and clatter usually associated with rolling mills.

✦ ✦ ✦

Capacity

INCREASE in tonnage output is not such an important factor of these new mills, although a 20 percent increase in tonnage per mill is anticipated. Their primary function is to meet modern standards of accuracy and to obtain greatest uniform quality and surface characteristics in keeping with metallurgical and chemical requirements of the steel. Each mill will have a capacity of 110,000 tons of #5 rod per year, or a total of 220,000 tons.

✦ ✦ ✦

Reels

AS each rod leaves the mill it passes through a semi-automatic switching device which switches the rod to the different reels, six of which are provided for each mill. In line with each mill and directly behind the reels is the operating pulpit where an operator starts and stops the mill, switches the rods from reel to reel, discharges the rods from reel to conveyor, and controls the drag conveyor movements. After each length of rod is coiled, the reel elevates and pushes the rolled rod onto a conveyor.

✦ ✦ ✦

Conveyors

TWO drag conveyors serve each mill. The rod bundle remains

(*Please turn to Page 448*)

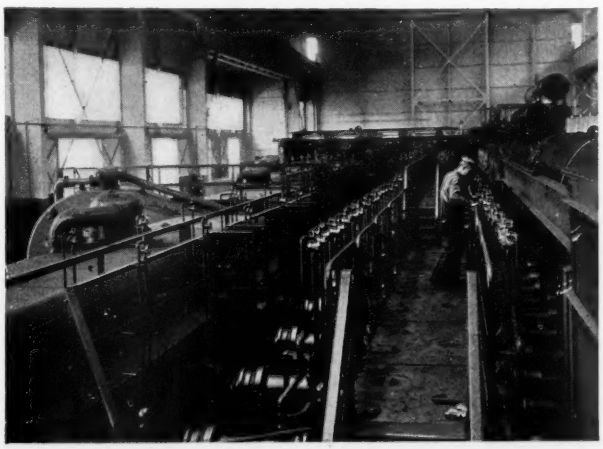


Fig. 12. General view of the driving side of one of the continuous rod mills.

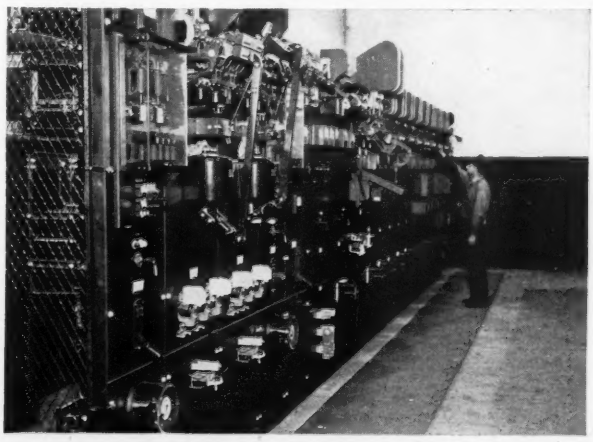


Fig. 13. The electrical control room.

✦ ✦ ✦ ✦

Standardization Results--- Better Trolley Wire--- Less Breakage---

By H. S. Murphy

Second Vice President, American Transit Engineering Association.

Years of work bring agreement on tests, tolerances and strength requirements. Approval by the American Standards Association recognizes general acceptance ✦ ✦

THE acceptance by the American Standards Association as American Standards of the trolley wire specifications prepared by the Conference Committee representing the American Transit Association, the American Society for Testing Materials, and the Association of American Railroads is the results of a movement started in 1921 by the A.T.A. (then known as the American Electric Railway Association).

✦ ✦ ✦

AT that time, in spite of the fact that trolley wire had been in use for 30 years, there were two generally accepted specifications for copper trolley wire in use and all previous attempts to reconcile them had failed. No specifications for bronze wire were in existence.

✦ ✦ ✦

THE A.S.T.M. specification considered trolley wire as hard drawn copper line wire classing it with wire used for general power and communications purposes. The A.E.R.A. specification treated trolley wire as a separate product because of its use as an inverted track and included tests not considered necessary or desirable in line-wire specifications. Many years operating experience of railway engineers showed that satisfactory trolley wire was not always obtainable under A. S. T. M. specifications and some wire makers had objections to the A.E.R.A. specifications.

Published by permission of The American Standards Association from "Industrial Standardization and Commercial Standards Monthly".

EXPERIENCE in the use of trolley wire indicated that it required a better surface finish and more care in manufacture than ordinary line wire which was only subject to direct tension. This had resulted in the development of torsion tests and it was in these tests that the specifications differed. It is easier now than it was then to imagine the results if a locomotive pantograph operating at 90 mph should contact a splintered wire.

✦ ✦ ✦

THE confusion occurring from two major specifications resulted in a conference between representatives of the two Associations in May, 1922. At that meeting, after very full discussion, "the manufacturer members were requested to provide a substitute for torsion tests which would give the results desired by the trolley wire users." It was also decided that the specification should provide for sizes of grooved wire larger than any then in use to cover possible use in steam railroad electrification and that it should be used as a basis for an American Standard. The Conference also started preparing specifications for bronze trolley wire.

✦ ✦ ✦

THE committees again conferred on April 27, 1923, without any common ground having been found regarding the torsion tests. As that meeting was approaching a conclusion without definite results the problem was solved by the late W. H. Fassett. He had a piece of twine in his hands twisting and untwisting it and finally remarked, "Well, I must admit that if I want to know what is in this the simplest way to find out is to untwist it." This broke the ice—a qualitative torsion test was set up and a joint specification for copper trolley wire prepared, submitted to both Associations, and adopted as a tentative standard at their 1923 Annual Meetings.

✦ ✦ ✦

THE first bronze specifications were adopted in 1925 and the strength requirements were purposely set extremely high. The A.S.T.M. and A.T.A. specifications differed somewhat in the number of twists required and this continued until 1927 when all differences were cleared up.

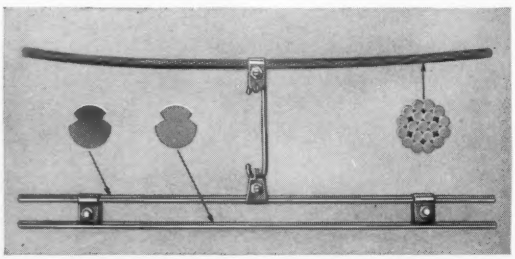


Photo. Courtesy Anaconda Wire & Cable Co.

Detail of the trolley construction used by the Pennsylvania Railroad—11,000 volts A. C.—Cross sections of the main messenger, 5/8 in. 19 wire (top), the auxiliary messenger 4/0 grooved copper wire (center) and the contact wire 4/0 grooved are shown. Arrows indicate the wire to which each section applies ✦

37 trolley wires enter this street car terminal. Contact wire for trolley cars, trolley busses, and electric railways are covered by American Standard Specifications.

IN 1933 the two standards, on copper trolley wire and on bronze trolley wire, were submitted to the American Standards Association for an approval as American Standard with the American Society for Testing Materials as sponsor. It was discovered, however, that to meet the needs of the manufacturers of trolley wire fittings dimensional tolerances for grooved wire were necessary. The question of the tolerances was, therefore, given further consideration by the Conference Committee and in 1935 revised standards were submitted to take the place of the original submittal. In the revised standards such tolerances have been included.

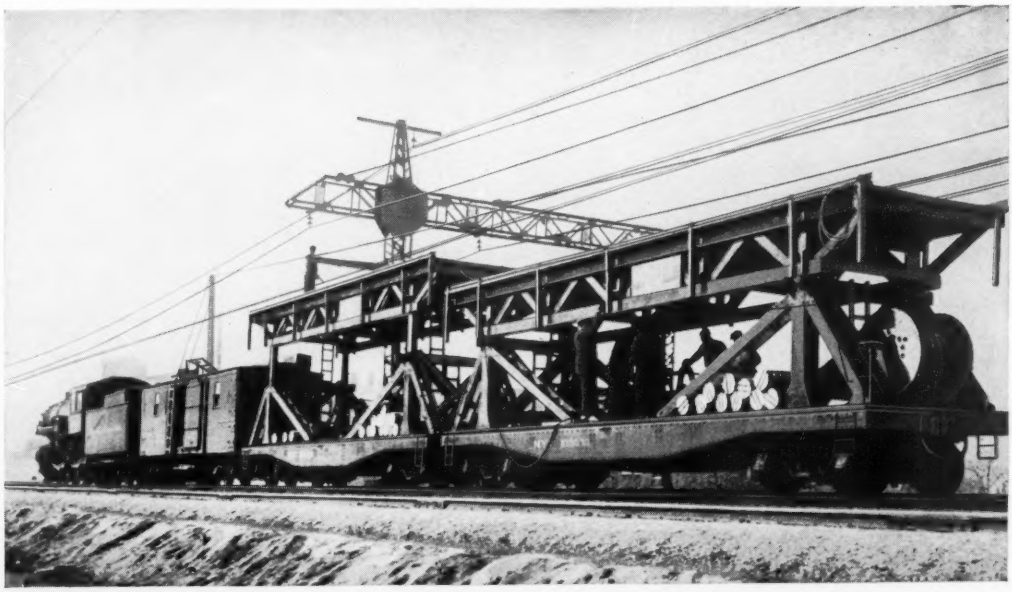
✦ ✦ ✦

SINCE the initiation of this project in 1921 the scope of the Conferences has broadened to include the Association of American Railroads, the American Mining Congress and the National Electrical Manufacturers Association so that all groups having a major interest in the use, manufacture, and installation of trolley wire have cooperated in the final result.

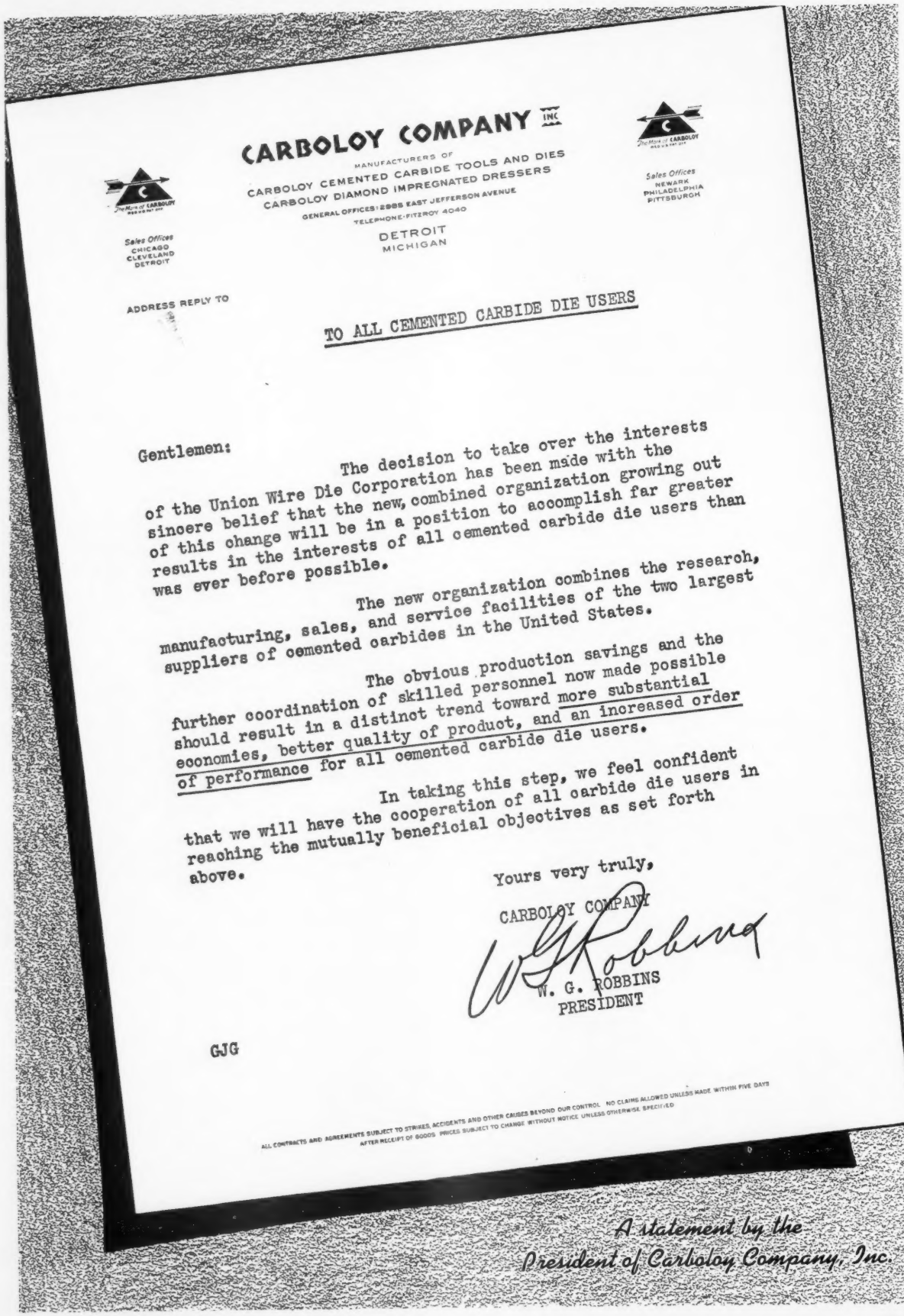
✦ ✦ ✦

WHEN a specification attains the status of an American Standard it is pertinent to inquire as to the results which will follow in improving the product covered. The present specifications do not differ materially from those originally prepared and therefore have

(*Please turn to Page 410*)



Installing overhead electric trolley wire for the Cleveland Union Terminal.



CARBOLOY COMPANY INC

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CARBOLOY CEMENTED CARBIDE TOOLS AND DIES
CARBOLOY DIAMOND IMPREGNATED DRESSERS
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TELEPHONE: FITZROY 4040
DETROIT
MICHIGAN

Sales Offices
CHICAGO
CLEVELAND
DETROIT

Sales Offices
NEWARK
PHILADELPHIA
PITTSBURGH

ADDRESS REPLY TO

TO ALL CEMENTED CARBIDE DIE USERS

Gentlemen:

The decision to take over the interests of the Union Wire Die Corporation has been made with the sincere belief that the new, combined organization growing out of this change will be in a position to accomplish far greater results in the interests of all cemented carbide die users than was ever before possible.

The new organization combines the research, manufacturing, sales, and service facilities of the two largest suppliers of cemented carbides in the United States.

The obvious production savings and the further coordination of skilled personnel now made possible should result in a distinct trend toward more substantial economies, better quality of product, and an increased order of performance for all cemented carbide die users.

In taking this step, we feel confident that we will have the cooperation of all carbide die users in reaching the mutually beneficial objectives as set forth above.

Yours very truly,

CARBOLOY COMPANY

W. G. ROBBINS
PRESIDENT

GJG

ALL CONTRACTS AND AGREEMENTS SUBJECT TO STRIKES, ACCIDENTS AND OTHER CAUSES BEYOND OUR CONTROL. NO CLAIMS ALLOWED UNLESS MADE WITHIN FIVE DAYS AFTER RECEIPT OF GOODS. PRICES SUBJECT TO CHANGE WITHOUT NOTICE UNLESS OTHERWISE SPECIFIED

A statement by the President of Carboloy Company, Inc.

An Announcement by Carboloy

To All Users of

"UNWIDIES"

(Widia Cemented Carbide Dies)

EFFECTIVE July 15, 1937, the Union Wire Die Corporation, engaged in the manufacture and sale of Widia cemented carbide drawing and extrusion dies, has sold, to Carboloy Company, Inc., its entire assets and interests in the cemented carbide business.

Carboloy Company, Inc., will continue to fill orders for Unwidies with Widia material. All grades of Carboloy die material will also be available exactly as in the past. Orders for Unwidies and Carboloy dies may be placed through exactly the same channels as in the past, and the same sales, service and manufacturing personnel will continue to serve you in the same way as before.

It is our sincere belief that this new organization, combining the research, manufacturing, sales and service facilities of the two largest suppliers of cemented carbides in the United States, will be in a position to accomplish far greater results in the interests of all cemented carbide die users than was ever before possible.

As stated by W. G. Robbins, President of Carboloy Company, Inc., in the announcement letter reproduced herein, we feel that the obvious production savings and the further coordination of skilled personnel now made possible, should result in a distinct trend toward more substantial economies, better quality of product, and an increased order of performance for all cemented carbide die users.

CARBOLOY COMPANY, INC.

Detroit, Michigan

CHICAGO • CLEVELAND • NEWARK • PHILADELPHIA • PITTSBURGH

Pacific Coast Representatives

LOS ANGELES, CALIF. • PORTLAND, ORE. • SEATTLE, WASH.

Offices and Plants of the Union Wire Die Corporation

MAIN PLANT AND OFFICES: STAMFORD, CONN.

BRANCHES: CHICAGO • CLEVELAND • NEW YORK • PITTSBURGH • TRENTON • WORCESTER

(*Continued from Page 407*)

been tested in actual use. It is our belief that larger users of trolley wire will agree that there has been an improvement and that it has occurred without increasing costs. Evidence to support this exists in the records of the American Transit Association Committee on Trolley Wire.

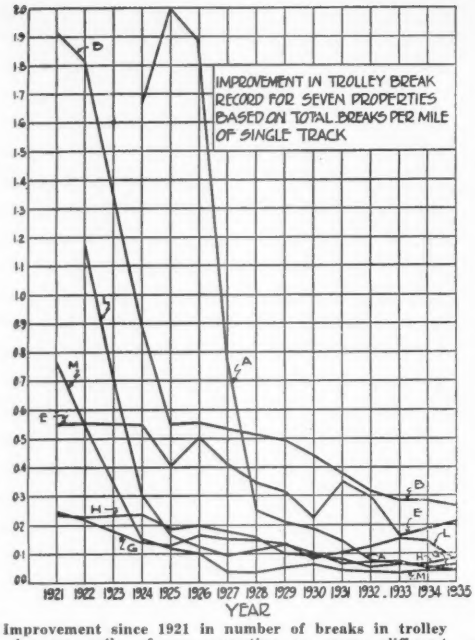
✦ ✦ ✦

ALMOST simultaneously with their work on specifications this group started a study of trolley wire performance using trolley breaks as their base. The result of the publication of these data obtained from a representative group of users has undoubtedly improved maintenance practices with resulting decrease in failure but it cannot be denied that better wire contributed very greatly to the betterment shown.

	1924	1935
Miles of line covered by report	7,178	9,938
Total trolley wire breaks	3,599	1,774
Breaks due to worn wire	1,018	501
Per cent of total	28.3	28.0
Breaks due to flaws in wire	348	29
Per cent of total	9.7	2.0

✦ ✦ ✦

IN addition to this, the trolley break records based on breaks per mile of line of seven large properties have been charted covering the period from 1921 to 1935. Results such as are shown here would have been impossible without satisfactory trolley wire.


IMPROVEMENT IN TROLLEY BREAK RECORD FOR SEVEN PROPERTIES BASED ON TOTAL BREAKS PER MILE OF SINGLE TRACK
1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935
YEAR

Improvement since 1921 in number of breaks in trolley wire per mile of car operation on seven different properties.

✦ ✦ ✦

TROLLEY wire constitutes a major use of copper. As of December 31, 1936 the surface electric railways in the United States and Canada operated 26,789 miles of line. In addition to this trackless trolleys (trolley coaches) now operate on 855 miles of route equivalent of 1,710 miles of overhead trolley; this particular use for trolley wire has arisen since active work on these specifications was undertaken.

✦ ✦ ✦

AS was anticipated by the original Conference, trolley wire has proven to be the best method of distributing power to electrified railroads which now operate 4,755 miles of trolley line. The Pennsylvania Railroad has just announced the proposed extension of main line electrification from Paoli to Harrisburg, Pa., which involves a number of branch lines and will cover 733 miles of track. When completed this system alone will have 2,677 miles of electrified line.

✦ ✦ ✦

IT is impossible to state accurately the weight of copper in active use in these installations which have a total length of 33,254 miles, but a conservative estimate indicates that it far exceeds 86,300,000 pounds. This wire is being constantly worn by current collecting devices and it has been estimated that normal replacements require more than 7,500,000 pounds of copper annually. It is easily seen that such enormous use necessitates proper specifications to obtain satisfactory material.

Make Your Plans Now To Attend

THE ANNUAL WIRE ASSOCIATION MEETING AND CONVENTION

To Be Held In Association With The

NATIONAL METAL CONGRESS

At ATLANTIC CITY, N. J. OCTOBER 18th to 22nd, 1937

There Will Be A Registration Fee of $5.00

Admission will be by Badge Only

New Special Atmosphere Furnace

By W. F. Ross, Engineer
Electric Furnace Co., Salem, O.

A new type of finish annealing furnace embodying many unusual features for the continuous annealing of brass, bronze, nickel silver, etc. is here described. ✦ ✦ ✦

MODERN manufacturing demands much in the way of closely held physical characteristics and finish from those who supply copper base alloys. The production of material such as bronze, brass and nickel-silver for commercial usage depends greatly upon heat treating practice, for specific grain size and hardness and efforts to better the quality of these products has resulted in greatly improved furnace practice and equipment during the last few years.

✦ ✦ ✦

A LARGE eastern company, The Riverside Metal Company of Riverside, N. J., whose products of brass, bronze and nickel-silver wire and strip stock are generally used throughout industry, has recently installed a finished annealing furnace embodying many unusual features of design and furnace practice. Not only does this furnace anneal metal with remarkable uniformity of grain size and predetermined hardness throughout the charge but it also produces finished material free from discoloration and oxidation.

Conveying System

THE material is conveyed through the furnace loaded on trays which are pushed at predetermined time intervals by a hydraulically operated pusher system located at the charging end of the furnace. These trays are carried on alloy rollers mounted in roller rails.

✦ ✦ ✦

EXCEPT for loading and unloading, the equipment is entirely automatic and is equipped with a time regulator by which the charging interval may be set for any desired cycle. An electrical interlock, composed of an arrangement of limit switches, at both the charge and discharge ends, insures fool-proof operation and reduces the operator's responsibility to a minimum.

✦ ✦ ✦

Controlled Atmosphere

SINCE this equipment was designed for the scale-free production of certain types of work, and the bright annealing of bronze, brass and phosphor-bronze, a special controlled atmosphere is used to purge the furnace of chemically detrimental oxygen from the air. This atmosphere is produced in a combustion type generator from ordinary 530 B. t. u. gas and is free from sulphur bearing components and moisture by means of scrubbing towers and a dehydrating refrigerator system. This atmosphere is introduced into the equipment at each end of the heating chamber and at the junction of the discharge vestibule and cooling chamber, in order to produce not only purging of the air within the furnace but to insure a continuous exfiltration of the atmosphere, which prohibits air from reentering the furnace.

✦ ✦ ✦

Temperature Control

HEAT to the furnace is provided by means of heavy cast heating grids suspended from the arch of the furnace and between piers on the furnace hearth. These grids are divided into two automatically controlled temperature zones which serve to heat the incoming charge

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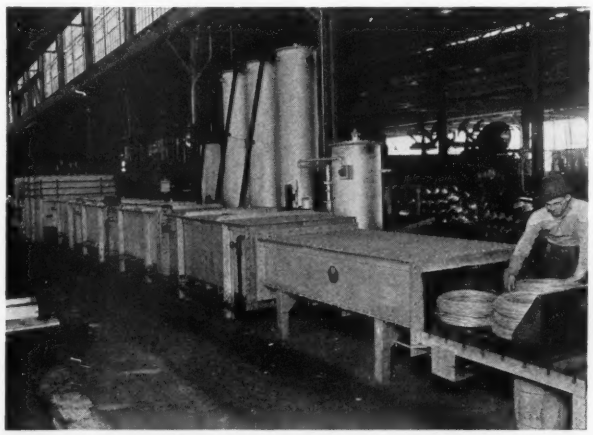

Fig. 1 shows the charging end of the 130 Kw. special atmosphere pusher type furnace for bright annealing Bronze, Brass and Nickel-silver wire.

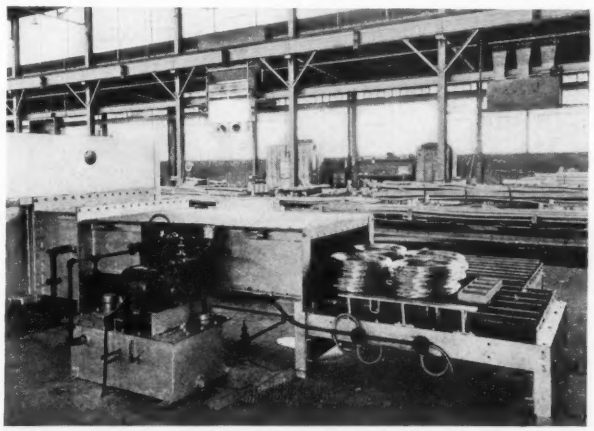

Fig. 2 shows the discharge end of the above furnace and shows trays of coiled wire being unloaded. This furnace anneals 1000 lbs. of wire per hour and the material comes out bright and dry. ✦ ✦ ✦ ✦

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Devoted to Products Made Wholly or in Part of Wire, Rod, Strip and Cold Drawn Steel.

J. W. Rockefeller, Jr., Section Editor.

Vol. 12 AUGUST, 1937 No. 8

Rubber As A Substitute For Wire Springs

As an indication of the competition the wire industry may be faced with in the field of suspension springs, this subject will be of interest. It is the idea of the authors of the paper that the time has now arrived when a better general understanding of the use of rubber is necessary in order to bring it into prominence in engineering materials. A digest arranged by J. W. Rockefeller, Jr. ✦ ✦ ✦ ✦

IN an interesting paper prepared by Mr. C. F. Hirshfeld, Chief of Research, of the Detroit Edison Company and E. H. Piron, Engineer, Transit Research Corporation, for the semi-annual meeting of the American Society of Mechanical Engineers at Detroit, Michigan, May 17-21, 1937, rubber cushioning devices were described. This subject should be of interest to manufacturers of wire springs as an indication of the competition the wire industry may expect in the field of vehicle suspension. The authors opened their paper with the history of rubber and a description of its manufacture from 1823 through the vulcanizing process invented by Charles Goodyear, and described the various compositions of which commercial rubber may consist. It was stated that the material of the type for uses described in the paper contained 5 to 10% or more of sulphur.

✦ ✦ ✦

FOR the purpose of the paper, it was considered sufficient to restrict statements regarding the properties of rubber to such materials as are used for vehicle springs and other similar mechanical purposes. Limiting the application to such materials, it was stated, "(a) Rubber offers comparatively small resistance to change of shape under the action of small external forces. (b) It is unique among material used by the engineer in that it permits deformations of relatively tremendous magnitude. (c) Its Modulus of Elasticity is low for tension, compression, and shear. It follows that it is deformed through relatively large distances by comparatively small forces in all three possible methods of loading. (d) In spite of its low compression modulus, it is an almost incompressible material in the same sense that water is. (e) It has to a great extent the characteristics of a liquid, for which Poisson's Ratio would be 0.5. The value of this ratio for rubber approximates closely 0.5 for small deformations. (f) When held under a constant load of the magnitude used in practical engineering work, compounded and vulcanized rubber undergoes a continuing deformation. The rate of deformation is rapid at first and then decreases gradually with time. (g) It follows from (f) above that the shape of the stress-strain graph obtained when testing rubber will vary with the rate at which the load is applied and with the total time during which the rubber is held in a strained condition. (h) The stress-strain graph obtained when unloading from such loads as are used in engineering work does not coincide with that obtained when loading. (i) There is another and closely associated phenomenon known as "elastic after-effect." When a deformed specimen is unloaded it does not immediately return to its original dimensions. The loop obtained when a complete stress-strain cycle is plotted does not close. (j) A further phenomenon which may be designated "accommodation to load" is of importance. If a sample of rubber is loaded and then

unloaded as during normal testing in tension, compression, or shear, and if this is repeated several times in succession each successive cycle will usually give results different from those of the preceding cycle. (k) The elastic properties of rubber compounds are very sensitive to temperature. (l) By long usage it has become customary to test rubber in tension in the same way that it has become customary to test steel in tension. Accumulated experience makes it possible to judge many of the properties from the tensile test in both cases. (m) Compounded and vulcanized rubber of the type here under discussion is a poor heat conductor. (n) It is a poor conductor of high frequency vibrations and is thus a poor conductor of sound throughout the audible range as well as of mechanical vibrations near the lower end of the audible sound range. (o) It has a comparatively high coefficient of thermal expansion. (p) It is highly resistant to many chemical substances although soluble in a number of the common organic solvents. (q) It is readily attacked by oxygen and particularly by ozone unless protected by antioxidants worked into it during the compounding. (r) Rubber readily picks up water in liquid or vapor form."

✦ ✦ ✦

METHODS used for designating compounds or stocks are then described by the authors. The matter of the ageing of rubber is also treated. With the drafting of rubber under load it was stated that since we are now using steel at temperatures which are subject to plastic flow, the drift of rubber under load is not apt to cause as great concern as it might have a few years ago. The drift of rubber has been investigated to a sufficient degree to indicate that if due precautions are taken in the choice of compound and in the design of the spring that does not present insurmountable difficulties.

✦ ✦ ✦

IN describing rubber as a spring material the authors stated, "As rubber has come into use as a springing material and has begun to displace steel and other metals for such purposes there has developed an expectable but regrettable controversy between the suppliers and the advocates of the two materials. This is regrettable because the arguments presented frequently have been partisan and therefore have tended to obscure the real facts and to delay impartial analysis. A case can be made for either material by properly choosing the assumed conditions and thus concentrating attention on this or that property or combination of properties. It may be said categorically that rubber can not completely displace metal as a springing material. But it is equally true that for certain conditions rubber is far superior to any known metal for springing purposes. The task of the engineer is the determination of the conditions under which rubber gives the better solution and the accumulation of the technical knowledge required to enable him to make the best use of rubber for conditions to which it is better adapted."

TABLE A

	Energy Absorbed	
	Steel Spring	Rubber Spring
Per cubic inch of space	27 in. lb.	16.5 in. lb.
Per pound of material	237 in. lb.	374. in. lb.

✦ ✦ ✦

AN interesting comparison was made between the energy absorbing profits of a steel wire, such as piano wire. and a rubber spring one inch wide, by ¼ inch thick, by 4 inches long. This comparison shows the energy absorbing properties of rubber to be over seven times that of the steel on a volumn basis and over fifty times as great on a weight basis. This comparison, however, was modified with a statement that the picture presented is not entirely fair since steel is practically never used for springing purposes in the way that had been assumed in the comparison. A fairer comparison was set forth in the case of a rubber spring which is in actual use in suspension of street cars. Springs which were made up of rubber and metal and in which the rubber was almost completely under shearing strain was compared with a series of two concentric helical steel springs. The comparison of energy absorption was given as in Table A.

✦ ✦ ✦

REFERRING to this comparison it was stated that a rubber spring of the type selected would probably cost more than the dynamically equivalent steel spring and would be of a more complicated structure.

✦ ✦ ✦

OTHER types of the rubber springs were outlined and several types of rubber springs actually in use were described in the paper. These consisted for the most part of rubber blocks between metal plates and were referred to as rubber sandwiches. A spring of this type may be put under direct compression or shear. Another form which the rubber spring takes is the torsion shear spring in which a metal shaft is surrounded by a block of rubber which in turn is incased in a metal rim. The rubber comes under a shearing stress when the rim is rotated relative to the shaft. In summing up the future of rubber in mechanical engineering the authors state: "The experience that the authors have had in adapting rubber to the springing of street cars and to other mechanical engineering purposes leads them to believe that there is a tremendous and hardly touched field for the use of rubber for mechanical purposes. It is a material with many unique characteristics which the mechanical engineer can use to good advantage in many applications if and when the necessary technical information becomes available. At present there are tremendous unfilled gaps in our knowledge of the properties of this material.

The Torrington Manufacturing Co. Announces New Spring Making Equipment

SINCE the early part of the century, **The Torrington Manufacturing Company**, of Torrington, Connecticut, has engaged in the manufacture of Wire Mill Machinery. Wire drawing machines, draw benches, flat wire mills, take ups, wire pointers and wire straighteners, as well as other mill machinery manufactured by this concern have made the company's name familiar in all parts of the country where non-ferrous wire is produced.

✦ ✦ ✦

BACKED by its wide experience in this field, the company has now entered into the field of spring manufacture with a complete line of spring coiling and winding machinery.

✦ ✦ ✦

FOR the past year, a corps of engineers, experienced in the design of spring making machinery, has been engaged in the development of high speed production equipment, with the result that the spring machinery which this company now places upon the market possesses decidedly novel features as contrasted with earlier designs.

✦ ✦ ✦

A FEW of the features of the new designs, as announced by the company, are: Simple Feed adjustment, safety hand wheel, fully enclosed compact design and built-in motor; ample wire and coil capacities in each machine; Timken Roller Bearing equipped; convenient accessible controls for pitch diameter, cut off, etc.; square clean cut ends; production speed variable either by change gears or standard variable speed unit; wire feed on clutch type adjustable through fixed center change gears or sliding gear box. The line includes segment and clutch type coilers in 8 sizes covering a range from .006" to 3/8" diameter wire and Torsion Spring Machines in 4 sizes covering a range from .006" to 1/4" diameter wire.

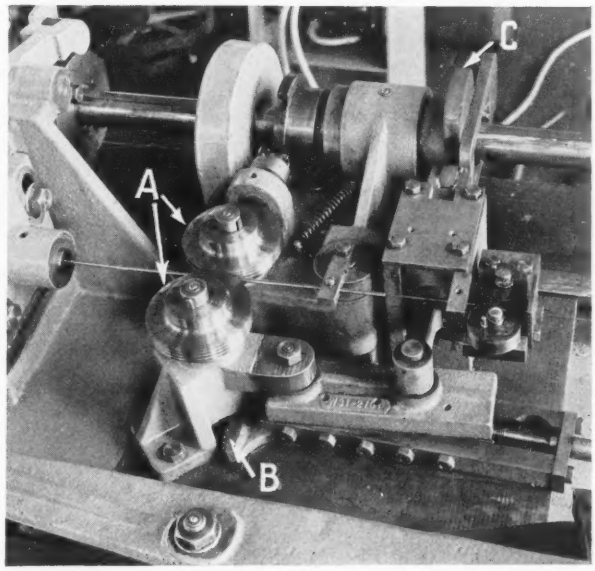


Fig. 1 . Torsion Spring Winding Machine Feed Mechanism ✦ ✦

In Torsion springs it is generally required that the projecting ends of the spring be held to a close tolerance. The wire feed mechanism was developed with this end in view.

The feed mechanism consists of a pair of feed rolls (a) driven by a segment gear, (b) a drive cam, (c) which operates the segment gear through an arm and adjustable block to vary the amount of wire fed, and a pressure cam to apply pressure to the feed rolls.

The cycle consists of four steps:

1. Applying pressure to the feed rolls (a) which grip the wire by means of pressure cam.
2. Driving the feed rolls the proper amount according to the length of wire to be fed by means of the drive cam (c).
3. Releasing the pressure to the feed rolls so that they do not grip the wire.
4. Rotating the feed rolls in a reverse direction to their starting position.

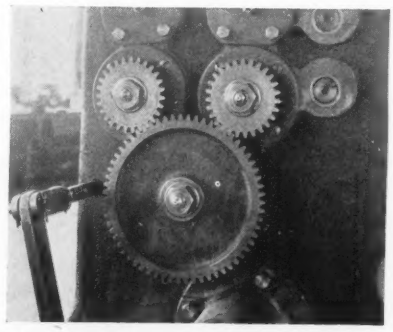


Fig. 2. Segment Type Coiler Feed Change Gear. On the back of the segment type coiler is a set of pick-off change gears. If it is necessary for the spring maker to produce on this machine a spring containing more wire than the rated capacity of the machine, he may do so by a special set of gears at this point. ✦ ✦

✦ ✦ ✦

IN the clutch type machine, positive clutch action is obtained by cam instead of the familiar spring return action. Cutting off time has been reduced by increased leverage with resultant reduction of cam time. The cutting arm is adjustable in an axial direction by a convenient adjustment on the coiling side of the machine and a simplified tool holder lock facilitates removal and replacement of the coiling tool.

✦ ✦ ✦

THE change gears on this machine are of the fixed center type. The operator has merely to slip the proper change of gears on fixed studs on the rear housing and no adjustment is necessary.

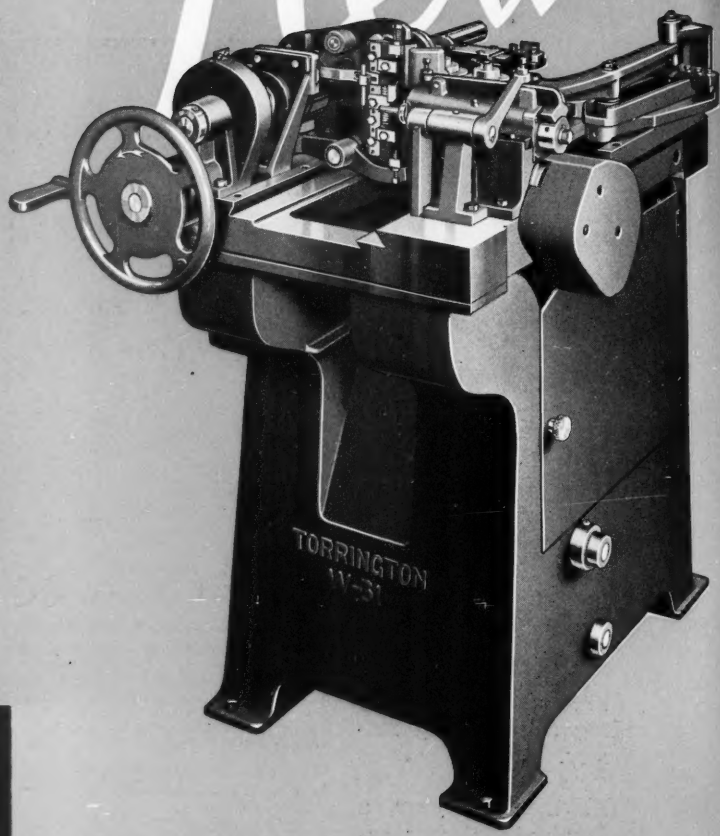
✦ ✦ ✦

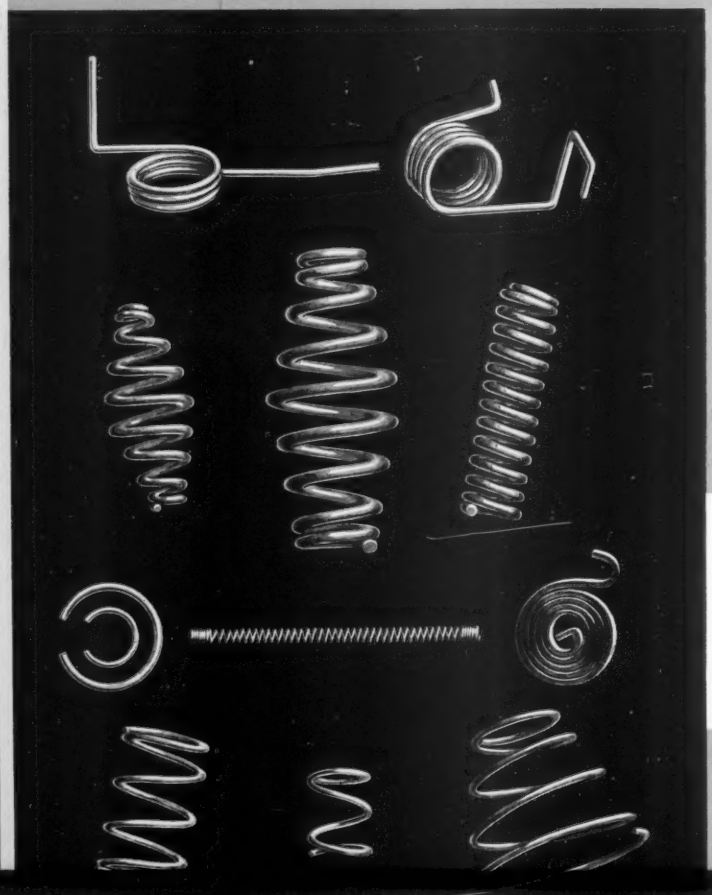
IN order to assure greater accuracy of spring length, a friction brake is employed to overcome inertia of moving parts and prevent coasting.

✦ ✦ ✦

A SIMPLE and practical wire feed adjustment has been in-

News





PATENTS PENDING

COILERS IN EIGHT SIZES
Range .006 to ⅜" Diameter Wire

TORSION MACHINES IN FOUR SIZES
Range .006 to ¼" Diameter Wire

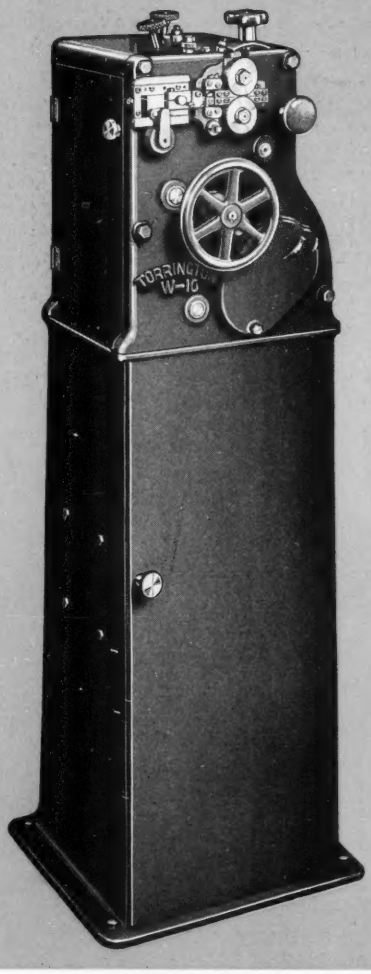
THE TORRING

FOR SPRING MAKERS

TORRINGTON

NEW-IMPROVED-MODERN

High-speed Automatic Anti-friction Spring Making Machinery



SEGMENT AND CLUTCH TYPE COILERS
TORSION SPRING MACHINES

- ★ High-speed production
- ★ Rugged, rigid construction
- ★ Timken Roller Bearing equipped
- ★ Convenient, accessible controls for pitch, diameter, cut-off, etc.
- ★ Simple feed adjustment
- ★ Safety hand wheel
- ★ Compact design — fully enclosed, built-in motor
- ★ Ample wire and coil capacity in each machine
- ★ Square, clean cut ends
- ★ Production speed variable either by change gears or standard variable speed unit
- ★ Wire feed on clutch type adjustable through fixed center change gears or sliding gear box

Attachments available for coiling square or odd shaped wire, rings, long length springs, etc.

GTON MANUFACTURING CO.

CONNECTICUT • U. S. A.

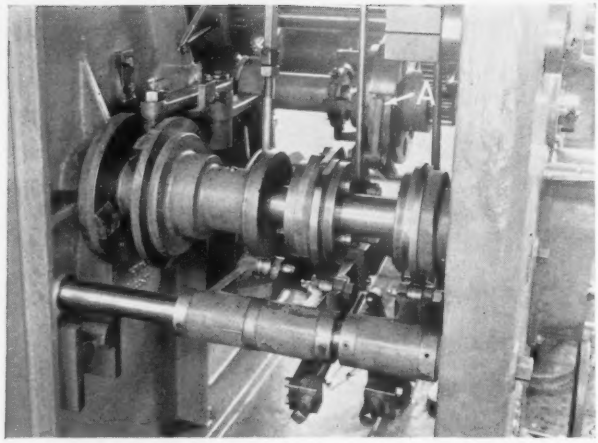


Fig. 3. Clutch Type Machine Wire Feed Mechanism ✦ ✦
On the clutch type machine, the wire feed clutch is operated by two adjustable discs on the cam shaft, one carrying the clutch engaging cam and the other the releasing cam. In connection with the clutch is a brake (a), controlled by the cam shaft. This brake immediately stops all movement of the feed rolls as soon as the clutch is released. The positive action of the clutch in both its engagement and release, combined with the action of the brake, results in a high degree of control over the amount of wire fed into a spring. ✦ ✦ ✦ ✦ ✦ ✦

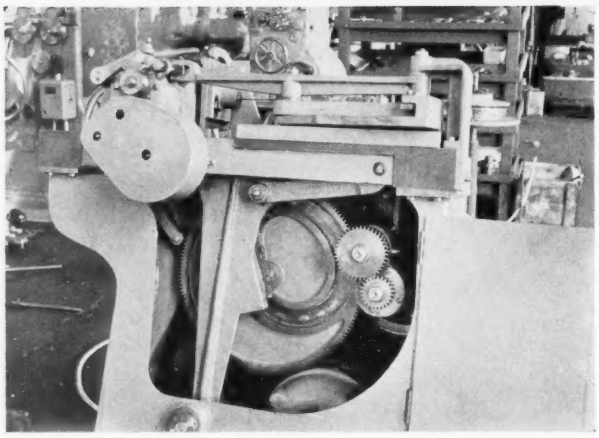


Fig. 4. Torsion Spring Winding Machine Spindle Drive Mechanism. ✦
The Torsion machine spindle drive is a combination of cam and compound levers. The cam allots time in the cycle of the machine in the following order:
Time for feeding the lead end of the wire into the spindle and for forming this end if required.
Time for winding the coils of the spring.
Time for cutting the wire and forming the projecting end of the spring.
Time for recoil and return of the spindle to its starting position.
The compound levers consist of a segment gear superimposed over the cam roll follower, and connected together by a sliding block. The adjustment of this block varies the amount of movement of the segment gear, which controls the number of turns of the winding spindle. ✦ ✦

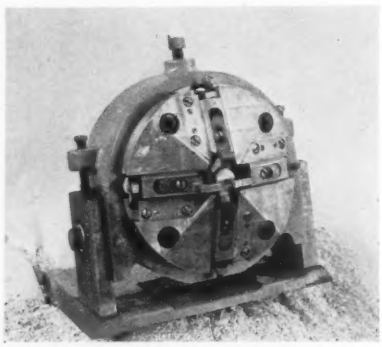


Fig. 5. Four Slide Forming Attachment for Torsion Spring Winding Machine. ✦
In the Torsion Spring winding machine the standard cutter slide will form springs in one plane. If more difficult spring forms are required, a four slide forming attachment may be substituted for the standard cutter slide.
This attachment consists of four slides operating around a central point at intervals of 90°; each slide controlled by its individual cam. The slides are adjustable radially around central point, and act at an angle of 20° to a plane perpendicular to the wire line. This facilitates the forming of sharp right angle bends in the spring form. ✦ ✦

corporated in the segment type machines having a wedge type locking gib operated by a single binding screw within the housing, but easily reached from the front of the machine. On the rear of the machine is a set of pick-off change gears through which amount of wire feed may be increased above the rated capacity. Another set of pick-off gears is enclosed on the front of machine whereby the operating speed may be adjusted to the job, without additional equipment. The cam shaft on both the segment and clutch type coilers is arranged at side of the machine where it is conveniently accessible for cam adjustment.

✦ ✦ ✦

THE torsion spring winder includes a novel departure from earlier practice in the spindle drive, which is by cam instead of the customary crank and gear. This allows ample time for forming special shapes of ends. Four slide attachments permit special ends of many varieties to be formed at a single operation.

✦ ✦ ✦

ALL machines are designed to produce wire springs quickly and accurately with a minimum amount of time required for adjustment.

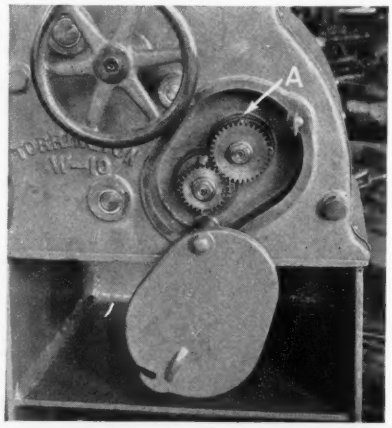


Fig. 7. Spring Coilers Change Gears.
On the front face of the machine, set in a pocket, and protected by a swivel cover, is a pair of pick off change gears (a). These gears give the operator control over the operating speed of the machine, so that spring production can be adjusted to its most satisfactory point without additional transmission equipment.

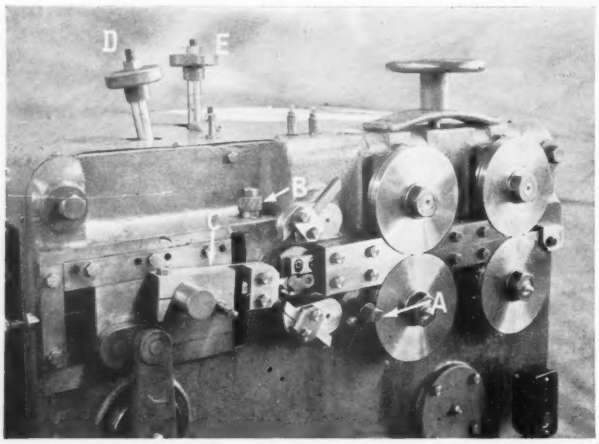


Fig. 6. Spring Coiler Cutter Arm Adjustment ✦ ✦ ✦
The cutter arms are adjusted axially by means of a screw operated from the front of the machine (a). The arbor and tool holder is clamped rigidly in place by means of a tool binding post (b).
The diameter slide is connected to its operating mechanism by means of a solid link (c). (d)—diameter control. (e)—pitch control. ✦

INSPECTION of A.S.T.M. Standards and Tentative Standards for rubber and methods of testing it is all that is necessary to show the state of knowledge of this material with respect to those matters which concern the engineer who would use it for mechanical purposes. References to it in mechanical engineering text books and hand books are almost nonexistent. On the other hand, the tremendous advances that have been made in the pneumatic tire within a generation show what can be done when attention is concentrated on the development of a particular type of rubber product.

✦ ✦ ✦

IF this material is to attain the position it seems to deserve in the field of mechanical engineering it must be investigated comprehensively as have, for examples, steel and the other commonly used metals. There is here an almost virgin field for mechanical engineering research. It is necessary that the subject be lifted out of the field of practically pure empiricism; that rational explanations of complicated phenomena be produced.

✦ ✦ ✦

IT is possible that reseach will prove rubber to be subject to exactly the same laws of elastic behavior as are metals but that certain characteristics are exaggerated and others submerged in such ways as to make it appear quite different. It is also possible that a thorough study of rubber may serve to enlarge and modify our present views with respect to the elastic behavior and composition of material in such a way as to result in a more nearly perfect interpretation of the behavior of more commonly used engineering material.

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WHATEVER the outcome, the subject is one of tremendous potentialities and, it is believed, of relatively tremendous importaance. But it must not be attacked in any superficial way if worthwhile results are to be expected. Rubber is not just rubber any more than steel is just steel. Inspection of the records of tests of rubber in the literature will show that they are in many respects like those of steel made a few generations ago.

✦ ✦ ✦

IT is true that rubber technicians have made great advances in the basic study of rubber compounds in the last few years. Most of them are employed by rubber manufacturers and their findings remain the properties of their employers. However, the time has now arrived when a better general understanding of this material is necessary if it is to fill the place it seems destined to fill among engineering materials.

More About Charged Agricultural Fences

IN connection with the article "Charged Agricultural Fences" which appeared in our July issue, the following comment will be of interest:

✦ ✦ ✦

"AFTER reading the article in your July issue entitled 'Charged Agricultural Fences', it seemed to me that the writer took a position much too favorable to this type of fence, considering the sad experiences so many people have had with it, even though many of them seemed to work satisfactorily.

✦ ✦ ✦

AT the American Society of Agricultural Engineers Convention a couple of weeks ago, this question of hooking on to high power lines came up for discussion and they drafted a resolution against farmers experimenting with electric power, particularly on the part of those not thoroughly familiar with the dangers always present when they hook on to high power lines.

✦ ✦ ✦

EXAMPLES were cited of the death of a child in northern Ohio a month or so ago, of livestock killed, of individuals 'freezing' to the wire and only getting off by climbing on to something that severed the current.

✦ ✦ ✦

THE engineers were agreed that no specifications have yet been prepared which are foolproof. For example, power which would be satisfactory on a short stretch of fence would be stepped up considerably on a much longer stretch. Furthermore, the voltage reducing equipment may get out of order and give somebody the full charge, as well as the livestock.

✦ ✦ ✦

THE amount of wire sold for this type of fence is so small that the wire people are not serving their best interests by advocating its use, excepting possibly for temporary purposes. When the ground is real dry they have trouble in grounding the current. When wet weather comes along it steps up considerably; in fact, there are so many dangers involved that, outside of the kind of sets which use storage batteries only, it is not advisable to publish articles unqualifiedly endorsing such dangerous practices."

✦ ✦ ✦

IN connection with this, it is pertinent to note that articles published in "WIRE & WIRE PRODUCTS" are the expression of the opinions of the author only and should be so regarded by all readers.

✦ ✦ ✦

IT is not the policy of the publication to advocate any particular type or equipment but only to publish the latest information available on various matters of interest to the wire industry as a whole.

A. S. T. M. — A. S. A. E. Fence Tests

THE American Society of Agricultural Engineers in 1933 took out membership in the American Society for Testing Materials and appointed the present chairman of your Fencing committee as official representative to cooperate with the Wire Test Committee of Sub-Committee VIII of Committee A-5 of A.S.T.M. in completing the steps necessary to bring about the inauguration of the atmospheric exposure tests of wire and wire products which A.S.T.M. had had under consideration for some years.

✦ ✦ ✦

YOUR representative served in this capacity and found that he could function principally as a proponent and guardian of the interests of agriculture in the discussions that took place and as an intermediary between the academic authorities at the colleges where the tests were to be set up and the A.S.T.M. authorities who represented not only consumers but also the producers of wire goods who had, incidentally, contributed largely to the fund which made the test possible.

✦ ✦ ✦

IT is a pleasure to report at this time that all fears, doubts and differences of opinion have been met and eliminated, completely satisfactory cooperative agreements have been signed between A.S.T.M. and all the colleges involved, the test materials have been received, prepared and, last winter, were set up at all the yards and the tests are now actually in progress. A very potent factor in the attainment of this successful conclusion has been the highly efficient leadership of Mr. F. F. Farnsworth, chairman of the A.S.T.M. Wire Test Committee and, latterly, chairman also of committee A-5. Through the broad experience and painstaking care of Mr. H. E. Smith, Engineer of Tests, the important routine of labeling the samples and properly mounting and erecting them has been so accurately attended to as to eliminate all fear of error in that regard. The most important test of this kind ever undertaken in this country is therefore now successfully under way.

✦ ✦ ✦

THE complete early history of the wire test program, its scope and methods of procedure and the personnel responsible for its carrying out was published in the 1934 Proceedings of A.S.T.M. and a final report on the setting up of the tests is given in the 1937 Proceedings. It is estimated that when the last report is completed, 20 years or more from now, the whole investigation will have cost approximately $100,000.00.

✦ ✦ ✦

AS a matter of brief record here it may be reported that these tests are located at eight sites under seven State Colleges and at three industrial locations as listed below. There are exposed at each of the College sites 67 samples of farm fencing each one rod long, 22 samples of barbed wire, and seven duplicate sets each of 120 samples of straight wire on frames, which wires as to be cut up and tested at the U. S. Bureau of Standards laboratory at intervals during the 20 years of test. These straight wires include all the wires used in the woven fence and barbed wire samples and many more besides.

✦ ✦ ✦

IN the test materials there are included uncoated wires of copper bearing and of non-copper bearing steel; copper bearing steel wires in 5 sizes from very small to very large, coated with galvanizing in 6 thicknesses ranging from very light to very heavy; there are steel wires lead covered and copper clad; there are stainless steel wires and galvanized wires that have been treated with dichromate solution.

✦ ✦ ✦

IN the list below are given the locations of the college test yards and the names of the men who will locally represent A.S.A.E. as members of the Fence Test Inspection Committee of Sub-VIII of A-5 of A.S.T.M.

Cornell University, Ithaca, N. Y.
Prof. B. A. Jennings
Iowa State College, Ames, Ia.,
Prof. H. W. Giese
Kansas State College, Manhattan, Kan.,
Prof. F. C. Fenton
Pennsylvania State College, State College, Pa.,
Prof. R. U. Blasingame
Purdue University, Lafayette, Ind.,
Prof. I. D. Mayer
Texas Agricultural Experiment Station, College Station, Texas,
Prof. H. P. Smith
University of California, Agricultural College, Davis, Cal., Santa Cruz, Cal.,
Prof. J. D. Long.

✦ ✦ ✦

THE industrial sites are:

Bridgeport, Conn.
Pittsburgh, Pa.
Sandy Hook, N. J.

✦ ✦ ✦

Present Problems

THE recent development of commercial methods for the production of practically pure zinc has placed on the market a metal which is ductile in contrast to the impure commercial zinc which has long been used for galvanizing and which is brittle. This essentially new metal is now being used for galvanizing fence wire, by one firm electrically for an electrolyte carrying zinc chemically removed directly from the zinc ore, by another firm electrically from a secret commercial electrolyte carrying zinc supplied from commercial bars of pure metal, and finally by hot dipping in a bath of the same practically pure zinc.

✦ ✦ ✦

THE ductility of the new zinc removes one of the major obstacles that have in the past stood in the way of heavier galvanizing on our farm fences. If now the worth of heavy coatings becomes apparent to the buying public it is fair to assume that there will be questioning as to the relative advantages of the three methods of application just cited. This is a matter that your Fence Committee might well investigate so far as possible in the near future.

✦ ✦ ✦

The Electric Fence

THE so-called electric fence has sprung into sudden prominence, many devices for controlling central station current for this purpose are being offered for sale, some being carefully engineered, others devised by tyros and in some instances 110 volt lines are being ignorantly connected directly to fences or through light bulbs

so large as to be without any protective effect. A farmer's daughter was recently killed by a directly connected fence in New York State, the child's feet being in a pool; in another instance nearby, a child that had "frozen" on a fence was pulled off by playmates; and in still another instance a young boy was rendered breathless and speechless when wet grounded from a fence and released only by the operation of the interrupter. Of all three of these instances the writer has received reports from individuals personally familiar with the occurrences.

✦ ✦ ✦

THE ideal electric fence is of great value to farmers on three grounds, it effectively restrains cattle, it materially reduces fencing costs, and it is especially useful for temporary fencing. This ideal fence is first of all not only safe under all conditions when first made but also it is so designed and constructed that there is no possibility of danger from subsequent break downs from any cause; it is effective in restraining cattle under both wet and dry conditions without having the dry setting dangerous for wet conditions; it is so designed that its performance characteristics do not change significantly with changes in the length of connected fence; its stimulating discharges are continually effective even though an animal persists in crowding the fence but these discharges are not so delivered as to afford no opportunity for release from their insistence.

✦ ✦ ✦

THE use of battery current for energizing electric fences would seem to involve no great technical difficulty but the design of control devices to secure from alternating current all the characteristics of the ideal fence is a problem presenting very serious technical difficulties.

✦ ✦ ✦

Union Sells Carbide Die Business To Carboloy Company

AN announcement has been made that effective July 15, 1937, The Union Wire Die Corporation, engaged in the manufacture and sale of Widia cemented carbide drawing and extrusion dies, has sold to Carboloy Company, Inc., Detroit, Michigan, its entire assets and interests in the cemented carbide business.

✦ ✦ ✦

THE new organization will combine the entire research, manufacturing, sales and service facilities of these two largest cemented carbide suppliers in the United States.

✦ ✦ ✦

BOTH **"Unwidies"** (Widia cemented carbide dies) and **Carboloy** cemented carbide dies will continue to be supplied as in the past and through the same channels of sales and service.

✦ ✦ ✦

SOME indication of the reasons for the combination of these organizations and the objectives that have been set up may be obtained from an announcement letter by W. G. Robbins, President of Carboloy Company, Inc. The letter follows:

✦ ✦ ✦

"THE decision to take over the interests of the Union Wire Die Corporation has been made with the sincere belief that the new, combined organization growing out of this change will be in a position to accomplish far greater results in the interests of all cemented carbide die users than was ever before possible.

✦ ✦ ✦

"THE new organization combines the research, manufacturing, sales and service facilities of the two largest suppliers of cemented carbides in the United States.

✦ ✦ ✦

"THE obvious production savings and the future coordination of skilled personnel now made possible should result in a distinct trend toward **more substantial economies, better quality of product, and an increased order of performance** for all cemented carbide die users.

✦ ✦ ✦

"IN taking this step, we feel confident that we will have the cooperation of all cemented carbide die users in reaching the mutually beneficial objectives as set forth above."

✦ ✦ ✦

IT may be of interest at this time to briefly review the introduction and use of cemented carbide dies in this country. Cemented carbides were introduced in the United States in 1928. Union Wire Die Corporation was appointed United States distributor of Widia cemented carbide dies by Krupp Works, Essen, Germany. Under this arrangement, Krupp imported Widia in hardened form. This hardened metal was then made into dies by Union Wire Die Corporation.

✦ ✦ ✦

IN the same year, the General Electric Company licensed Carboloy Company, Inc., to manufacture and sell Carboloy cemented carbides in the United States. The introduction of Carboloy was preceded by several years of development work by General Electric Company.

✦ ✦ ✦

CEMENTED Carbide dies were rapidly adopted by those engaged in the drawing and extrusion of wire bar and tubing. Today, every mill in this country uses cemented carbide dies to some extent and many are 100% equipped with this die material.

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Aluminum-Coated Steel May Find Industrial Applications Shortly

IT is reported that Professor Colin G. Fink of Columbia University has developed a new process for coating steel with aluminum. Patents have been granted and commercial applications are expected shortly.

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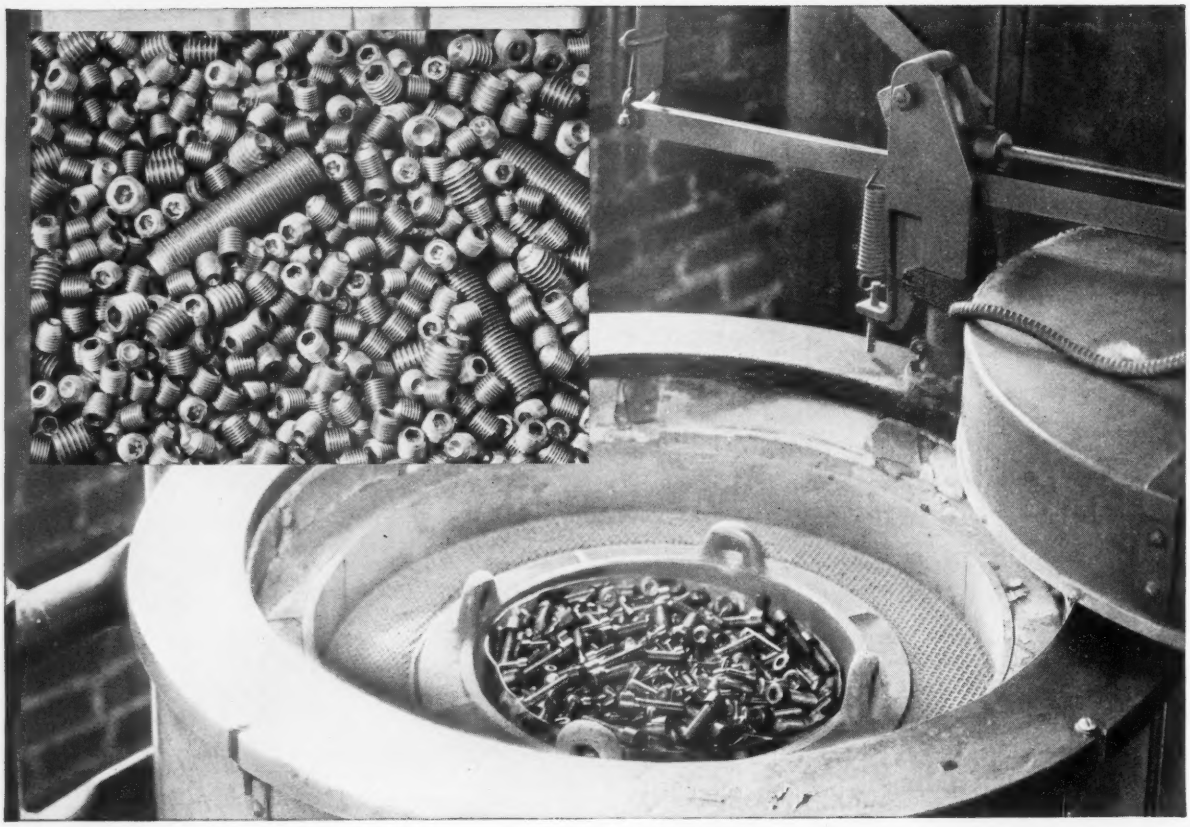
THIS latest form of steel, according to Dr. Fink, "combines the high corrosion resistance of aluminum with the great tensile strength of steel". It has already been used experimentally in airplanes, automobiles, buildings, railroads, house furnishings and industrial machinery. For a number of reasons, he believes, the aluminum coated steel "promises

(*Please turn to Page 440*)



Uniformity . . . PROTECTED BY HOMO TEMPERING

Because the physical qualities of set-screws must be rather exactly balanced, precise tempering is vital. Enough draw must be conceded to prevent breakage, yet enough strength retained to foil the husky who slips a pipe over his set-wrench handle.

The Mac-it Parts Company finds that Homo forced-convection tempering give the uniform, controlled heat that solves this tempering problem. They pre-determine both temperature and time of draw, and set the Recording Controller so that tempering is automatically done just as they want it. Skill and experience are concentrated on deciding what temperatures are needed—rather than on watching the furnace to make it hold them. And the Homo record of each batch helps the heat-treater apply his experience to best advantage on succeeding batches. As a result, tempering is a solved problem in this plant. Other plants can enjoy the same advantages; details on request.

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Vol. 12 AUGUST, 1937 No. 8

Cold Finishing Bar Steel

By E. J. Kopf

Union Drawn Steel Co., Massillon, Ohio

It is only within recent years that full knowledge of the many advantages of cold drawn bar steel has become general. A description of the processes involved in manufacturing this product is given herewith. +

Historical

THE early history of the cold drawing of iron and steel is rather vague but it has been rather definitely established from old manuscripts that the manufacture of wire by drawing through dies was practiced as early as 1,000 A. D. From early prints, it is evident that little progress was made in drawing methods until the advent of steam power, early in the seventeenth century, and it is interesting to note that, at least insofar as recorded history reveals, cold drawing of ferrous metal in bar form was not attempted until the century had almost turned.

+ + +

IT is a curious fact that the idea of cold drawing steel in bar form came from a customer of one of the mills, who, about 1888, sought a channel section for use on the product which he was manufacturing. This suggestion led to experimental work in which both supplier and customer collaborated. Some of the men who were associated with this beginning of a great industry which now employs thousands of men and millions of dollars of capital are still living and they are able to relate many interesting stories of the problems which had to be solved before the process was placed on a commercially practical basis. A particularly difficult matter was that of straightening the drawn bars and many expedients were tried, including that of suspending them vertically from the roof rafters before suitable straightening machines were developed.

+ + +

AS a result of this development, **The Union Drawn Steel Co.** was organized in 1889 for the purpose of engaging in the manufacture of cold drawn bars. From this small beginning has grown a great industry today represented by more than twenty producing companies. While first efforts were confined to the drawing of soft steels, today's mills draw all grades of carbon, alloy and stainless steels, excepting only the very high carbon tool steels.

+ + +

AT the outset, much of the output of the industry was rounds, used to replace lathe-turned material for line shafting. A particular advantage of cold drawn shafting was that it could be produced in greater lengths than the turned product without sacrifice of accuracy. Great impetus was given to the infant industry by the advent of mass production of machine parts as practiced by the early bicycle and sewing machine manufacturers, since it was able to produce economically and in large sizes, material having closer accuracy, better finish and greater machinability than can be attained by any other method. Reversing the situation, there are many with-

(*Please turn to Page 422*)

THE AUTHOR

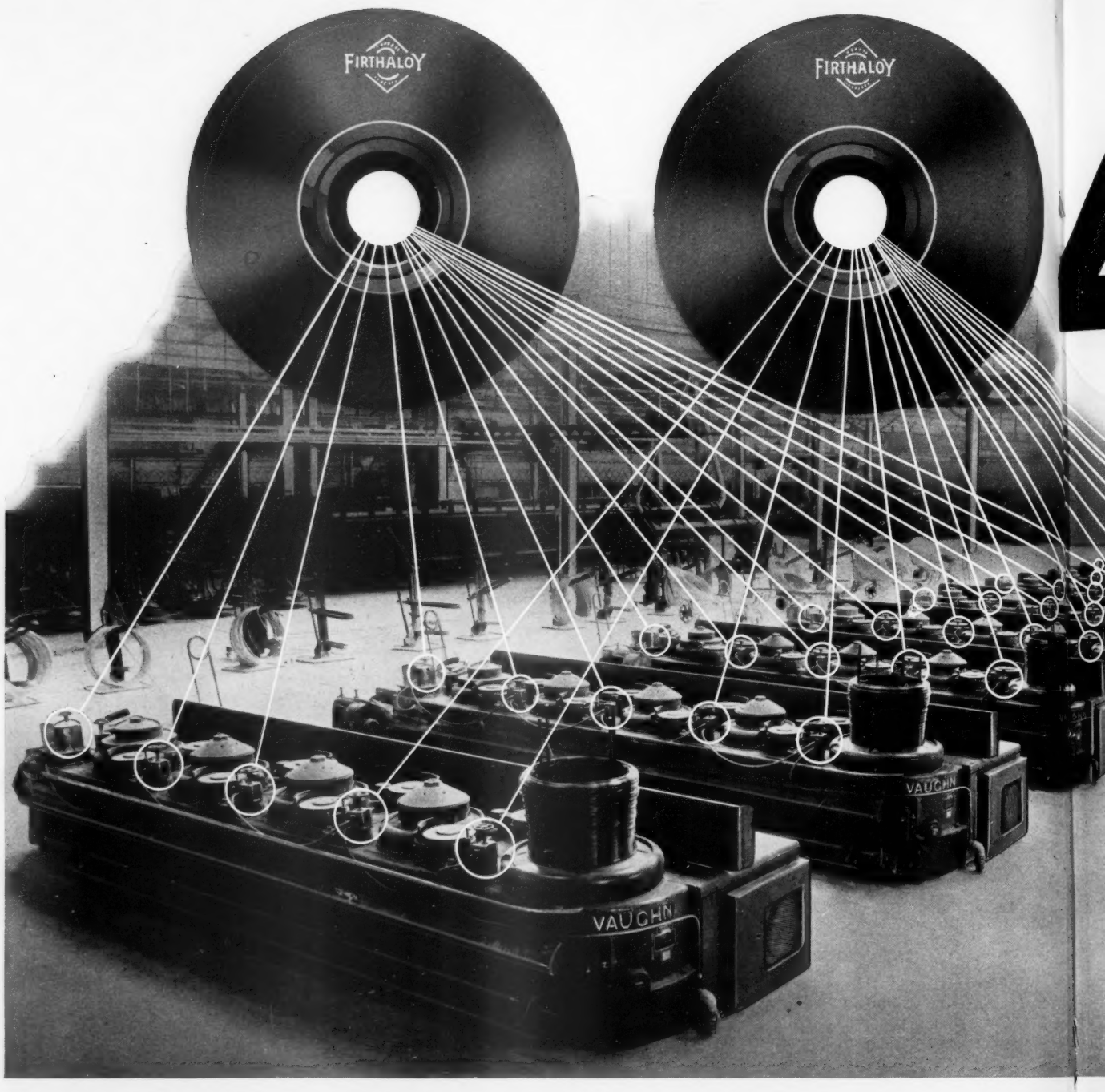
Elmer J. Kopf, who recently joined the advertising division of Republic Steel Corporation, Cleveland, was formerly advertising and sales promotion manager of Union Drawn Steel Company, Republic subsidiary in Massillon, Ohio, and continues to direct Union Drawn advertising in connection with his new duties.

+ + +

Early training gave him an interest in technical matters which subsequent association with organizations handling advertising and publicity of leading steel companies turned in the direction of steel production and fabrication, and he is the author of a number of articles on these subjects.

+ + +

Mr. Kopf's connection with Union Drawn Steel Company afforded him an opportunity for specialized study of cold finished steel and its uses and he spent much time in the plants of the company and its customers, studying production, application and fabrication, and gathering data which served as a basis for advertising and technical literature issued by the company.



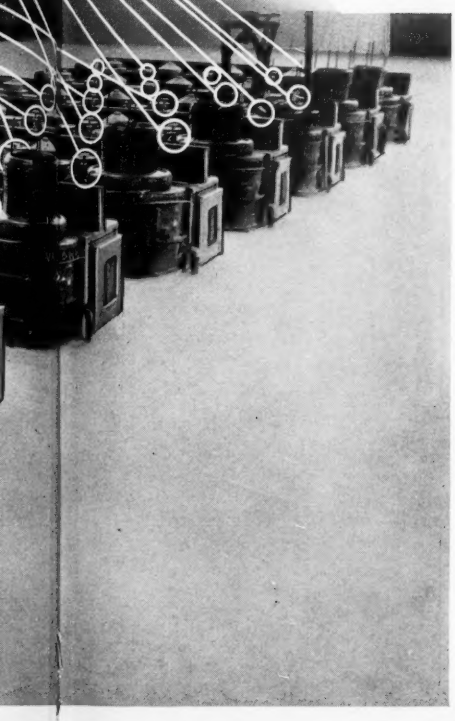
FIRTHALOY PRODUCTS

Wire Drawing Dies — Tube Drawing Dies
Extrusion Dies — Special Shape Dies
Wire Guides — Spring Wire Applications
Arbors or Mandrels — Wear Resistant Parts, etc.

FIRTH ◆ ST

STEEL CO

40 FIRTHALOY DIES GIVE THIS BATTERY OF MODERN MACHINES THE UTMOST IN WIRE DRAWING EFFICIENCY



Today, increased production costs make plant modernization more important than ever. The higher speeds obtained with modern wire drawing machines require carbide dies to effect maximum savings. Longer die life at higher speeds results not only in lower die costs, but contributes substantially to the economical operation of these modern drawing units through increased production, reduction in die set-up time, fewer rejections, and more uniformity in wire sizes on all runs. Many large mills realizing these factors have included FIRTHALOY Dies in their modernization program because they have found that FIRTHALOY Dies meet every requirement. They also obtain additional economies by extending this modernization program to include their die recutting shop and find FIRTHALOY Die Machinery the most efficient.

FIRTHALOY Dies and Die recutting machinery are the answer to complete modernization.

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PHILADELPHIA DAYTON
GLOBE WIRE DIVISION, McKEESPORT, PA.

(*Continued from Page 419*)

in the industry who give credit to the development of cold drawing for the success of mass production of precision parts as practiced today on a large scale.

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THE art of cold working steel in bar form has advanced to a point where intricate shapes are now being produced, bars straight within .005″ in 20 feet are not unusual, and accurate cross sections within tolerances as small as .00025″ can be produced in some sizes and shapes.

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Processes Essentially Same As Those In Wire Mills

THE processes employed in the production of cold drawn bar steel are essentially the same as those used in the wire mills. The material is received in the form of hot rolled bars which are pickled to remove the hot rolling scale and then drawn cold through dies similar to those used on wire blocks. However, multiple drawing of bars is not commonly practiced and, for this reason, large inventories of hot rolled bars are maintained in order to meet the demand for cold drawn steel of different sizes, shapes and grades. In this connection, it may be interesting to note that there are more than 20,800 standard sizes of rounds, squares, flats and hexagons (to say nothing of "odd" decimal and metric sizes) and, while there are a limited number of popular sizes and grades in general demand, the mills must be equipped to produce promptly any standard size in any of the more than one hundred SAE steel grades or special specifications used by large manufacturers. In addition, orders may call for bars of any length ranging from a few inches to the maximum capacity of the drawing equipment.

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Equipment Required

WHILE the processes employed in cold drawing bar steel are similar to those used in the production of wire, radically different types of equipment are necessary due to the different form of material involved.

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Heat Treating

BARS are usually received from the hot mills in lengths of 20 to 30 feet, the length of the hot rolled material having been worked out to produce multiplies of the desired finished length after the bars are cold drawn. Owing to the effects of cold working on steel and in order to meet physical specifications or provide improved machinability, it is sometimes necessary to anneal bars, before cold drawing and car type furnaces large enough to accommodate material up to 40 feet long must be available for such treatment when necessary. Annealing after cold drawing is also specified occasionally, in which case pipe or controlled-atmosphere annealing is employed to prevent scale formation.

Pickling

BEFORE cold drawing, bars are pickled to remove scale which results from hot rolling or annealing. Long wood tubs are required for this purpose and an agitated solution of sulphuric acid at elevated temperatures is employed. In Union Drawn mills, mechanical agitation is employed. The agitator consists of a number of endless bronze chains traveling on sprockets completely around the tub. The chains are long enough to provide a dip or cradle which extends into the tub and reaches below the level of the acid. A lift of bars rests in this cradle and the chains are set in motion by driving sprockets, causing the bars to tumble, thereby expediting the action of the acid and creating a mechanical movement which tends to break up the scale. This practice eliminates the necessity of removing bars from the pickling solution before the action of the acid is completed and makes an important saving in pickling time as compared with previous methods which did not make use of mechanical agitation.

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Lime Coating

AFTER pickling, the bars are thoroughly washed with high pressure water spray and dipped into hot lime water to neutralize any acid which may have been left after washing. As they leave the lime water at a temperature of about 180°F, they dry quickly,

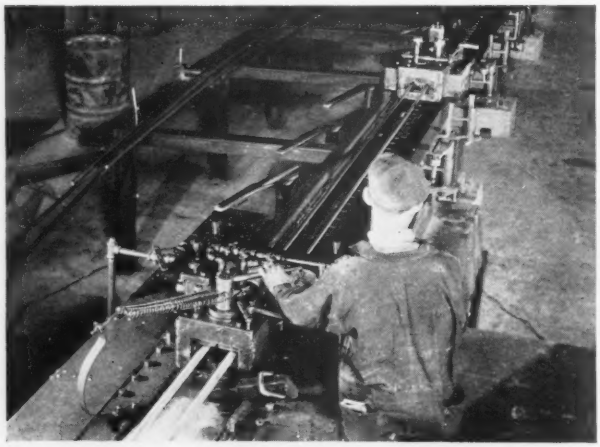

Fig. 1. General view of draw bench, showing pusher and die head (lower center) and draw head (upper right). ✦ ✦ ✦

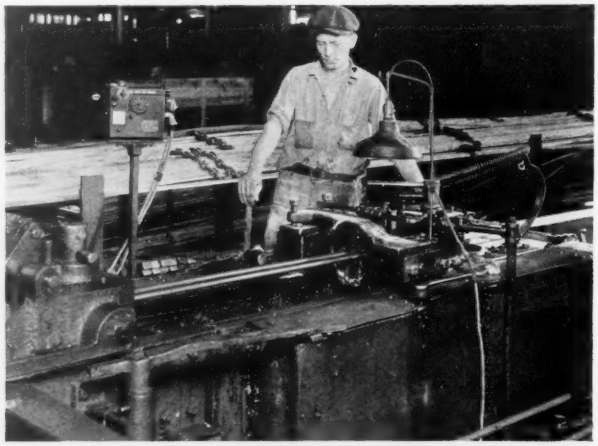

Fig. 2. Draw bench. Draw head at left is drawing two bars through multiple dies shown in center of picture. ✦ ✦ ✦

leaving a thin coating of lime over their entire surface which serves as a rust inhibitive and lubricant for the subsequent drawing operation.

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Draw Benches

THERE are numerous types of drawing machines or "draw benches", capable of drawing from one to six bars at a time. It has been found, however, that there is a practical limit to the number of bars which can be drawn efficiently at one time and machines for drawing more than three bars simultaneously are not in general use.

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Pointing

PRELIMINARY to cold drawing, bars are "pointed" on one end to permit ready passage through the dies. The pointing process consists in turning down or otherwise reducing the cross section of the bar for a sufficient distance to permit it to be passed through the dies and grasped by the jaws on the draw head or "buggy" which will draw it through the dies. After drawing the pointed end is cut off and discarded. On some of the more modern machines in use in Union Drawn mills, a patented pushing device forces the end of the bar through the die, eliminating the necessity for pointing and the attendant heavy scrap loss.

Cold Drawing

AFTER the bars have been pushed or "threaded" through the dies, they are gripped by the jaws of the draw head which engages the sprocket chain, as has been noted, and is propelled forward on long rails, pulling or drawing them through the dies. The benches in general use are capable of drawing bars up to about 40 feet long and are equipped with an automatic release which opens the gripping jaws of the draw head when the opposite ends of the bars have passed through the dies, allowing them to drop down on arms which have swung into place over the rails. A second set of arms operating from a position beside the rail now swing across the rails pushing the bars off into trestles erected beside the bench. The draw head then returns to the die head to repeat the drawing operation, pushing both sets of arms back out of the way.

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DRAW benches formerly used did not have the automatic release and throw-off feature described above, and it was necessary for an operator's assistant to walk along the drawhead, releasing the bar after it was drawn, pushing it off onto the trestle and returning it to the die head to repeat the drawing operation.

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Lubrication

LUBRICATION has kept pace with the mechanical advancement of cold drawing practice with the result that, whereas it was formerly necessary for the operator to grease the bars before they entered the dies, present day equipment delivers a constant stream of filtered oil over the material, just back of the die head, assuring perfect lubrication, better finish and longer die life.

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Dies

DIES too have undergone notable improvements during the development of the cold drawn bar industry but this is a subject which the producers of die steels are better fitted to discuss. It has been indicated earlier in this article that there are more than 20,000 standard sizes of rounds, squares, hexagons, and flats shown in the manufacturers' standard extra lists and it is interesting to note that while it is unlikely that any individual mill possesses die equipment for producing all of these sizes, the number of popular sizes for which die equipment is available runs into thousands.

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Straightening

AFTER cold drawing, the bars are automatically fed into a straightening machine. In the case of rounds, the bars are straightened by rotating them at high speed through staggered sets of concave rolls, the opposing rolls being set at different angles. Other shapes are straightened on special-

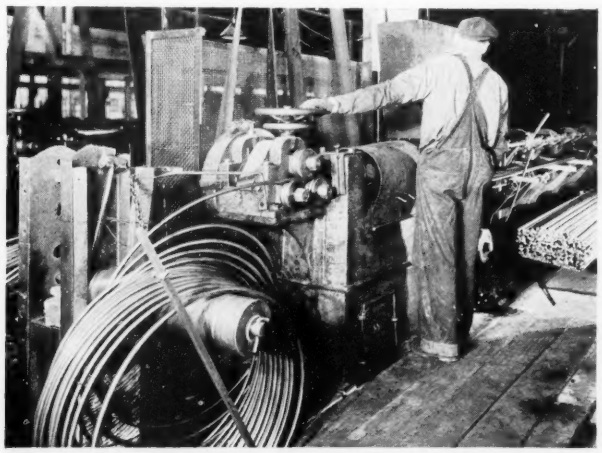

Fig. 3. Straightening bars drawn in coils and cutting to length.

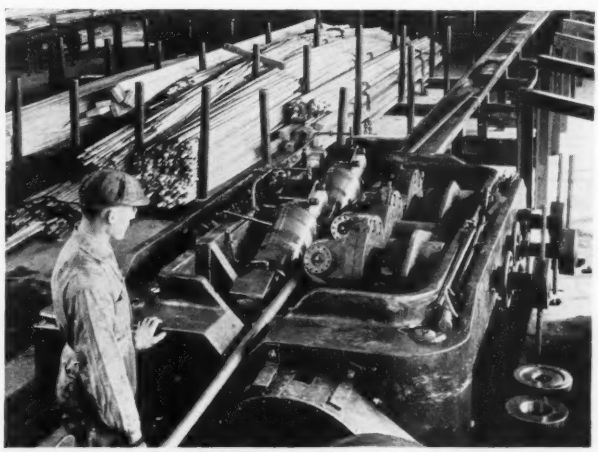

Fig. 4. Roll straightener and polisher used in straightening and polishing cold drawn rounds.

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ly designed machines which consist of a plurality of flat rolls so spaced and adjusted as to deliver pressure to all faces, thus bending the bar slightly in all directions and thereby relieving drawing strains and producing a commercially straight piece.

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STRAIGHTENING of rounds on the roll straightener, described above, involves so many factors that it might aptly be termed an art. The amount of pressure exerted on the bar, the speed at which it rotates and the angle at which the rolls are set all have a bearing on the result produced by the straightening operation. The type of steel being straightened must also be considered since different steels respond differently to the action of the straightening rolls. Most steels have a tendency to "roll up" or increase in diameter as a result of straightening and the complicated calculations involved in this operation will become evident when it is understood that, while Bessemer screw stock does not roll up, the diameter of open hearth steels of different grades will increase in varying amounts ranging up to .008". The significance of this phenomenon can readily be appreciated when it is considered that, while the standard manufacturing tolerance of a 7/8" round bar of SAE 1112 Bessemer screw steel is only .002" and that of a similar size bar of SAE 1045 is .003", the former does not roll up while the latter grade has been known to increase in diameter as much as .008" during straightening. Complicated calculations are, therefore, frequently necessary in order to maintain standard manufacturing tolerances on all of the various steel grades which are cold drawn.

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WHILE long experience has enabled cold finishers to compile some definite figures for use in this connection, we still experience occasions when the steel does not react to the straightening operation in the conventional manner, in which case these calculations are of no avail and experimental work must be resorted to in order that the problems may be solved.

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Cutting The Bars

STRAIGHTENED bars are cut to length on a special type of cutter known as a "cracker". This device consists of two hardened steel dies, one stationary and the other movable in a vertical plane. The latter travels in vertical grooves so arranged that its cutting edge barely misses the cutting edge of the stationary die as it descends. The bar to be cut is rested on the stationary die and literally cracked off by a quick stroke of the movable die. In cutting to length, the bars are placed in a long trough and fed through the cracker between the dies until the ends come in contact with an adjustable stop which has previously been set to give the desired length. This contact causes the movable die to descend, cracking or cutting through the bar. Bars are usually drawn in 36 foot lengths and cut into three twelve foot pieces, this being the most commonly used length. However, any desired length may be cut by this method. Bars which are too large in cross section for cracking, or on which square ends are required, are cut by saws, lathes or abrasive cutting wheels.

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Inspections

AFTER cutting to length, all bars are individually inspected over their entire length for surface defects and quality of finish. Some mills are now equipped for electrical non-destructive testing designed to detect light seams and internal defects. The equipment, known as a magnetic analyzer, is used to supplement visual inspection where the soundness of the material is of particular importance.

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Range Of Sizes Produced

WHILE the range of sizes in which cold drawn bar steel is produced may vary with different mills, its extensive scope is indicated in the following list of sizes regularly produced in **Union Drawn** mills:

Rounds 1/16" to 2 7/8", inclusive
Squares 3/32" to 4 1/2", inclusive
Hexagons 1/8" to 3 1/2", inclusive
Flats 3/32" to 1/8" thick, 2" maximum width
1/8" to 5/32" thick, 3 1/4" maximum width
5/32" to 3/16" thick, 3 1/2" maximum width
3/16" to 4" thick, 4 1/2" maximum width
1/4" to 2 1/2" thick, inclusive, 12" maximum width

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Turning And Polishing

ALTHOUGH rounds are sometimes drawn in sizes up to and including 3½ inches, surface finish in diameters over 2⅞" is not comparable to that of smaller sizes and, since they are employed largly for shafting or other applications to which the special qualities produced by cold drawing are not essential, they are usually produced by turning and polishing. This method of processing produces bars with a high degree of size accuracy, concentricity and straightness and a highly polished surface which makes them particularly suitable for shafting applications. As turned and polished material is free from strains such as are set up by drawing, there is practically no tendency to warpage when the bars are machined unsymmetrically for keyways, etc. To meet the demand for material of this type, it is produced in a complete size range from 1⅛" to 8" diameter both inclusive.

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TURNED and polished rounds in sizes up to and including 6 1/16" are produced on special lathes or turning machines and the length in which they can be furnished is limited to the length in which hot rolled material is available and the working space available for processing them. In Union Drawn mills, it is not uncommon to fill orders for turned and polished bars 64 feet long. Rounds larger than 6 1/16" are turned on centers in conventional lathes and the maximum length which a producer is able to furnish is regulated by the capacity of his lathe equipment.

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The Turning Machine

THE turning machine for producing sizes up to 6 1/16", inclusive, consists of two rotary

cutting heads holding the cutting tools. In contrast with the conventional lathe, the work does not revolve but is fed horizontally through the machine by a lead screw and the tools, instead of traveling horizontally, revolve about the work. The first set of tools with which the bar comes in contact takes a roughing cut, removing several thousandths of an inch from the entire circumference of bar, while the second set is employed for finishing. After turning, the bar is polished in the same manner as cold drawn rounds.

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Tolerances

FROM the above description, it might be assumed that the production of turned and polished material is a very simple matter but the actual operation brings many intricate problems to light and there are numerous eventualities which may result in curtailment of production if not serious damage to the machine. Straightness, it should be readily evident, is a very important matter and all hot rolled bars are carefully straightened over their entire length before turning. Concentricity is also an important requisite as it can be seen that a hot rolled bar which is not within standard tolerances for which the tools are set will not "clean up" properly at points where the out-of-round condition exists. Magnetized stock and picking up of chips may cause trouble and great care must be given to proper setting of tools so that one will not cut too deep or too shallow. An appreciation of the importance of these factors may be gained from consideration of the fact that a 6" round bar of material containing .30% carbon or less must be held within a tolerance of .005" on the diameter. If the carbon content of the steel is over .30%, the standard tolerance is exact to .006" under. These accuracies apply to the full length of the bar. Undersize tolerances only are maintained to assure proper fits without the necessity of further reducing the bar diameter.

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Grinding And Polishing

WITH the development of higher speeds and the demand for closer accuracy, another product of the cold finishing mills which has come into wide use is the bar having a ground and polished surface. Both cold drawn and turned bars can be furnished with this type of finish. This product is the last word in perfection and, in small sizes, can be held within a total tolerance of .00025". Inasmuch as this accuracy applies not merely to short lengths such as pins and similar commodities but to the entire length of bars up to 24 feet, the difficulties of manufacture can easily be appreciated.

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Types Of Grinding Machines

BARS up to 4½" diameter are ground on grinders of the centerless type; larger rounds are ground on centers. Hexagons, squares, flats and special sections may be ground on one or more flat sides by the use of special surface grinding equipment.

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Finishes

GROUND rounds have a mirror-like finish and are carefully straightened to within a tolerance of .005" in 20 feet. Punch or gag-press straighteners are used and the craftsmen employed for this important operation develop an accuracy and skill to be found in only a few highly specialized occupations.

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Advantages Of Cold Drawn Bars

WHILE turned and ground bars represent important items in the output of the cold finished steel industry, cold drawn steel continues to make up the bulk of its output. In order that we may properly understand the reasons for the widespread and growing use of that product, it is necessary to point out the beneficial effects of the cold drawing process on steel. These may be set forth, not necessarily in the order of their importance, as follows:

1. **Surface finish**
2. **Accuracy to size**
3. **Accuracy to cross section**
4. **Straightness**
5. **Improved physical properties**
6. **Improved machinability**

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1. Surface Finish

IT has been noted in the early paragraphs of this article that bars are pickled to remove hot

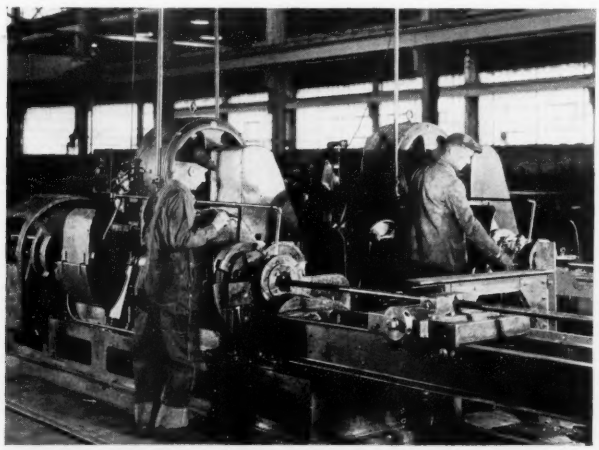

Fig. 5. Turning Machine. Bars are rough turned, finish turned and polished in one operation.

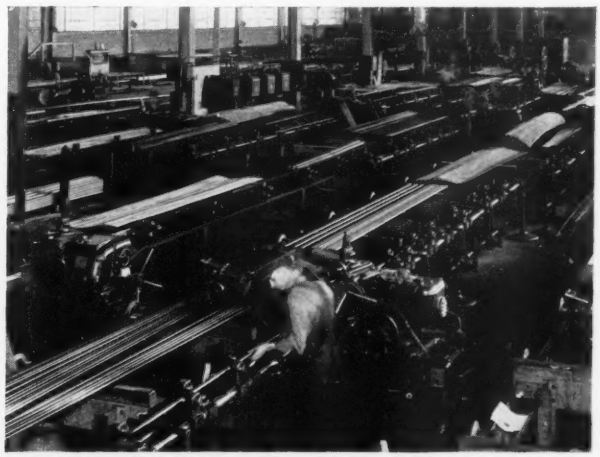

Fig. 6. Centerless grinding produces bars of very close accuracy and high surface finish.

rolling scale before cold drawing. The drawing process has a further effect on the appearance of the material, producing a bright, smooth surface, largely free from imperfections. In the case of turned and polished or ground and polished rounds, the surface finish can be accurately described as mirror-like.

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2. Accuracy To Size

TOLERANCES of cold drawn bars of standard shapes range from exact to .002″ under on rounds up to 1″ to exact to .006″ under on squares larger than 2½″ in steels of .30% carbon or less. On steels of more than .30% carbon, tolerances for the same sizes and shapes are, respectively, exact to .003″ under and exact to .008″ under. Even on turned bars as large as 8″ diameter, the total tolerance is only .008″, while total tolerances of .0005″ are frequently called for on ground material and it is possible to hold smaller rounds to exact to .00025″ under.

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3. Straightness

WHILE straightness is a comparative matter, this factor is developed in commercial cold finished bars to a degree exceeding that of other forms of finished steel. A straightness specification of .002″ in 10 feet is not uncommon and a 20 foot bar can be held within a straightness of .005″.

4. Accuracy To Cross Section

ACCURACY to cross section is an important quality of cold drawn steel, and a valuable feature where close fitting of parts made from this material is called for. The concentricity of a cold drawn round bar is equal to one-half of its size tolerance, which means that, in an ordinary cold drawn bar having a total tolerance of .002″, the eccentricity will not be over .001″. Hexagons, squares and flats are equally accurate to cross section and are characterized by parallel, flat sides, sharp corners and accurate angles.

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Effects Of Cold Drawing

A VERY interesting phenomenon of cold drawing, and one well known to the wire industry, is its effect on the physical properties of steel so processed. Table A shows the actual results of cold drawing with a normal draft a bar of SAE-1020 steel.

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Metallurgy Of Cold Drawing

THE effect of cold drawing on the yield point or point of definite deformation, which is really the figure determining the utility of a steel part, is most interesting. All steel grades react similarly to cold drawing although it should be noted that the results bear a definite relation to the carbon content of the steel, the increase in physicals for a given draft decreasing as the carbon content increases. By varying the amount of draft within practical limits, a wide range of physical properties can be produced in steel of any given chemical composition.

TABLE A

	Pickled Hot Rolled	Cold Drawn to 1″ Diameter
Ultimate Strength	57,750 psi	81,250 psi
Yield Point	36,500 psi	78,750 psi
Elongation in 2 in.	39%	16%
Reduction of Area	65%	55%
Brinell Hardness	118%	170%

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THIS effect of cold drawing on physical properties is put to practical use in many ways. As an example, it is frequently possible, by the use of a heavy draft, to eliminate the need for heat treatment. Again, the added strength of cold drawn steel may permit important reductions in weight and in the size of parts. In other instances, it may permit the use of steel of lower carbon content and consequent better machining properties without sacrifice of strength.

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Machining Qualities

IT has been noted earlier in this discussion that the success of the cold finishing industry was due, in a large measure, to the growth of mass production of parts which had its origin in the bicycle and sewing machine industries and was

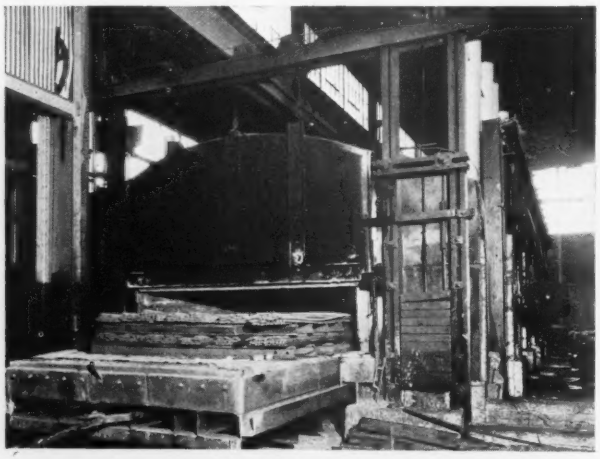

Fig. 7. Car type annealing furnace. Bars are frequently annealed before cold drawing or between drafts.

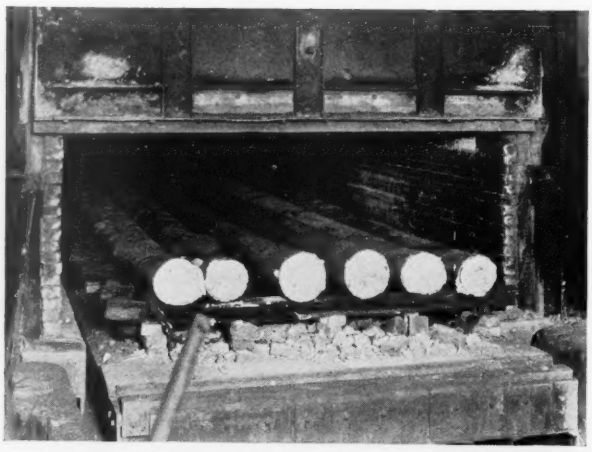

Fig. 8. Pipe annealing after cold drawing prevents formation of scale.

✦ ✦ ✦ ✦

given great impetus by the development of the automobile, business machines, farm equipment, household appliances and various types of machinery. It is probable that at least seventy percent of the production of cold finishing mills is "cut up" on automatic and hand screw machines in the production of parts for such equipment. A consideration of the qualities of cold drawn steel which so admirably fit it for machining in this manner seems, therefore, to be in order.

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Automatic Screw Machine Operation

THE automatic screw machine, which has largely replaced other types of machinery for the manufacture of precision parts of symmetrical cross section, consists of a number of rapidly revolving spindles through which bars are moved forward into contact with cutting tools. When bars are moved into position, they are firmly gripped by the collets and caused to revolve at high speed while the tools are "fed" into them. There is one or more tools for each spindle, and different operations are performed on the material in each position. As the tools in each position complete their operations on the bar, the head holding the spindles indexes to the next position where other tools work on the bar. This sequence continues through a number of positions corresponding to the number of spindles until the completed part is cut from the bar in the final position. Thus, a number of bars equal to the number of spindles can be machined simultaneously and there are an equal number of parts in progressive stages of completion.

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THE bars, usually in ten to fourteen foot lengths, are fed into the spindles through long tubes and are held only by the collets just behind the cutting tools, the opposite ends being free and supported only by the tube wall.

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IT is very important that they be straight since crookedness of the rapidly revolving bars, in addition to causing friction or binding in the tubes, will set up vibration which causes rapid wear of spindle bearings and other parts and soon destroys the accuracy of the machine. Cold finished steel meets this requirement of straightness better than any form of bar steel which has yet been developed.

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THE fingers which feed the bars into contact with the cutting tools and the collets which grip them and cause them to revolve while being machined cannot be constructed to accommodate wide variations in size or cross section of the material. Such variations cause slippage or jamming and may result in heavy spoilage of parts or serious damage to the machine, to say nothing of loss of production time. The accuracy of cold drawn steel is such however, that these dangers are eliminated.

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Costs And Time Saved In Machining Operations

THE accuracy and high finish of cold drawn steel is also an important factor in reducing tool cost and machining time since no machining is required on surfaces where the original cross section of the bars corresponds with that of the finished part.

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SCALE such as is found on hot rolled steel is highly abrasive and causes rapid wear of tool cutting edges. Its complete removal from cold drawn steel results in materially longer tool life, lengthened intervals between tool grinding with corresponding reduction in down time of machines and increased production. In addition, absence of scale eliminates pollution of the cutting compound which is also frequently used as a lubricant for the machine parts, thereby preventing rapid wear of bearings, shafts and other moving parts.

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RECORDS of power consumption in machining hot rolled and cold drawn bars and comparison of machined finish have definitely established the fact that cold drawing increases the machinability of steel. While space will not permit a thorough discussion of this phenomenon, the theory ad-

Fig. 9. Visual Inspection of Cold Finished Bars. Bars are individually inspected over their entire length. ✦ ✦ ✦ ✦

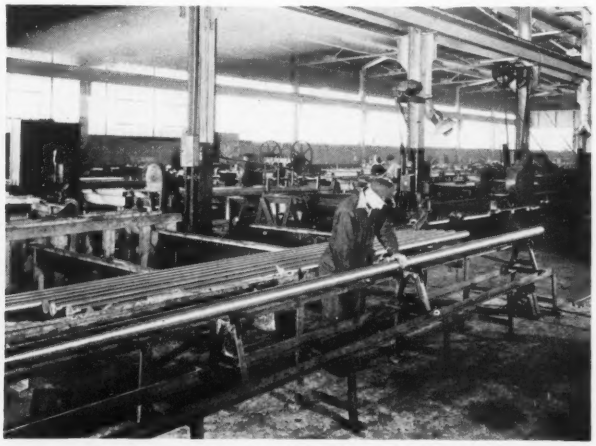

Fig. 10. Testing shafting for straightness. Dial indicator shows variations as bar is revolved. ✦ ✦ ✦ ✦

vanced by those who have made a study of the subject may be briefly explained as follows.

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IN cutting steel, the edge of the tool does not actually sever the material but, by a wedge action, breaks or tears the chip away from the main body an infinitismal distance ahead of itself. On this basis, it is evident that the qualities requisite to good machining (aside from those of chemistry and structure) are low strength and low ductility, the former so that the material will tear easily and the latter to permit the chip to break off readily and cleanly—a condition essential to easy cutting and smooth finish. While it is true that cold drawing increases the strength of steel, its effect on the ductility factor far outweighs this increase, at least insofar as machinability is concerned.

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THERE is another interesting feature of the mechanism of cold working that is accepted as contributing to improve cutting qualities, particularly from the standpoint of finish. When steel is hardened by cold working, slip occurs along the cleavage planes in the ferrite so that after cold drawing we can visualize the ferrite crystals as being composed of layers of soft ferrite separated by a strong amorphous film at the slip planes. This amorphous film gives support to the soft ferrite layers and makes it easier for the tool to wedge its way through the successive thin layers of ferrite, leaving a smooth finish on the machined surface. The thickness of these ferrite layers can be reduced by additional cold working and, up to a certain point, the finish in machining can be improved.

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Research

OF course, there are other important factors contributing to the cutting quality of steel such as chemical composition, microstructure, grain size, etc. It is natural that since such a large proportion of its product is employed in the production of machined parts, the cold finishing industry should have given much attention to these factors as affecting machinability. Extensive research has been and is being carried on with the cooperation of the hot mills and steel users. Out of this study have come changes in melting and rolling practice, revisions in analysis and even new steels designed to give increased machinability. As an example, the present SAE-X1112 grade (high sulphur Bessemer screw steel) follows very closely the chemistry of Union Supercut, a development of Union Drawn metallurgists designed to provide cutting qualities approaching those of some of the non ferrous metals. It cuts 36% faster than SAE1112 (Bessemer screw steel) which, until the development of Supercut, was the accepted standard of machinability. When it was first introduced to the trade, machines capable of completely utilizing its remarkable free cutting qualities were not available and machine builders were obliged to redesign their product in order to take full advantage of its greater machinability.

MANY other steels shown in the present SAE specifications had their origin in the research of cold finishers seeking to combine better cutting qualities with desirable physical properties.

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MORE recently, a change in the method of production has enabled Union Drawn to offer Bessemer Screw Steels from which the abrasive elements associated with tool wear have been largely removed. This improvement has been made without change in chemistry or physical properties and has been acclaimed by many users as an important steel in lowering the cost of steel parts.

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CARBON, alloy and stainless steels have also been the subjects of study of cold finishers with the result that the cutting qualities of all steel grades have been greatly improved and it is reasonable to expect further interesting developments as the result of research which producers are now conducting.

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WHILE cold drawn bar steel has been in use for almost half a century, it is only within recent years that full knowledge of its many advantages has become general. Since that time it has been a prime factor in reducing the cost of many industrial products and it is today an important consideration of the majority of engineers and designers in the development of new products and the revision of old.

Join the Wire Association

Annual Dues $10.00 — Includes:

1. The cooperative, confidential services of the Association through which members exchange ideas without identities being revealed and endeavor to help each other in plant management and process problems.
2. Participation in all Meetings of the Society.
3. A copy of the ANNUAL WIRE BUYERS' GUIDE AND YEAR BOOK OF THE WIRE ASSOCIATION.
4. A subscription for one year to the designated official publication of the society, WIRE AND WIRE PRODUCTS.

Make Your Plans Now to Attend
THE ANNUAL
WIRE ASSOCIATION MEETING
AND CONVENTION
To Be Held
At ATLANTIC CITY, N. J.
OCTOBER 18th to 22nd, 1937

JOHN MORDICA

An Appreciation of a Master Craftsman

IT is our very sad duty to announce to a world of friends the sudden and untimely death on July third of John Mordica, and to extend to his family and a host of friends throughout the world, our heartfelt sympathy and condolence in their bereavement.

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JOHN Mordica can never be replaced! The loss of his kindly, unselfish counsel and assistance will be universally missed and the absence of his genial, inspiring personality will be sorely felt as long as those of us, who were fortunate in knowing Jack, continue to live. We consider our experience of John Mordica's friendship as a happy privilege constituting one of life's outstanding compensations. We knew him as the perfect head of a happy and honorable family and as an unselfish and reliable friend. The number he has helped over life's obstacles and inspired to greater effort and accomplishment is myriad.

✦ ✦ ✦

BORN in Kelloe, County of Durham, England, January 25, 1873, John Mordica migrated to America with his parents, James and Elizabeth Mordica, in 1879, settling in Steubenville, Ohio. As was true of all ambitious boys of his time, John Mordica went to work at the early age of eleven. He saw service in mines, and in sheet and tin plate mills, but since his father was one of the early pioneers in the infant wire industry of America, it was indeed quite natural for Jack to follow his father's footsteps.

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IN his time John Mordica worked in all of the important wire mills of the country. After serving his apprenticeship as a wire drawer, he worked in several different plants in which widely different wire products were made with the idea of learning all about all kinds of wire. This combination of technical and practical wire knowledge brought him up to be superintendent of the Independent Steel & Wire Co., Kenova, West Virginia until 1921. Then he accepted the position of general foreman of the Wire Mill with the Cambria Iron Co., Johnstown, Pa. This company was later taken over by the Bethlehem Steel Co. Mr. Mordica worked up to be Assistant Superintendent. In 1925 it was decided to build the plant at Sparrows Point, Md., and Mr. Mordica was selected as superintendent of this. During the erection of the entire plant he acted in an advisory capacity to the Engineer in charge and with the opening of the plant, as operating Superintendent.

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NO one has had a more varied experience in the wide diversity of this important industry and no man has contributed more to the world's knowledge of wire nor has done more to bringing that product to its present high standard of quality by the development of equipment and processes than John Mordica; at the time of his death he was the acknowledged "Dean of the Wire Industry". His name is on the same roll with many other great men of the Steel industry.

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"THE Wire Association" owes much to John Mordica's leadership and wisdom. He was the first president and, in recognition of his great service in helping over the rough road which a new organization must of necessity carve for itself, he had the rare honor of being Permanent Honorary Past President, which post he held until he left us.

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LIKE all true craftsmen, Jack's greatest satisfaction in life was derived from the happiness in his work and the joy in helping his fellow workers in the art. His untimely death left many of his plans uncompleted but "he rolled his hoop until the end". May those of us he has left behind be inspired by his life with the power and the vision to carry the torch of progress forward!

JOHN MORDICA
1873 - 1937

The directors of

The Wire Association

desire to record their lasting sorrow at the great loss the Association and the wire industry have sustained with the passing of

John Mordica

on July third, nineteen hundred and thirty-seven.

Mr. Mordica was one of the charter members of the Association, a member of the board of Directors, and president of the Association for the first five years of its existence. At the time of his death he was permanent Honorary President of the Association.

Mr. Mordica was a man of sterling character, forceful, courageous and direct in all his dealings. His convictions were deep-seated and sound and to the best of his ability he lived up to them. He had a personality that brought him the affectionate regard of those who knew him well and endeared him to all with whom he came in contact.

He stood in the front rank of his profession. His breadth of view, his innate fairness and his sound judgment made his advice invaluable. With little thought of compensation, he was helpful to those who called on him whether rich or poor and has left a record worthy of emulation and a name that is cherished by his sorrowing friends.

Be it therefore Resolved, that in the death of John Mordica, The Wire Association and the wire industry as a whole have suffered an irreparable loss, and that the Officers, Directors and Members of The Wire Association tender to his family and friends their sincere and profound sympathy in this great bereavement.

Outstanding Personalities of the Wire Industry

Ralph K. Clifford, General Works Manager, Continental Steel Corp.

RALPH K. Clifford has been appointed general works manager of the Continental Steel Corporation effective immediately.

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MR. Clifford graduated from the University of Michigan in 1914 and since that time has been successively general chemist, general metallurgist, assistant general superintendent, and general superintendent of the company.

✦ ✦ ✦

HE is a member of the open hearth committee of the American Institute of Mining and Metallurgical Engineers and, as a member of the Executive Committee of that organization, has been extremely active.

RALPH K. CLIFFORD
General Works Manager, Continental Steel Corp., President, The Wire Association.

✦ ✦ ✦

N. F. Melville, Manager Manufacturers Wire Sales, Pittsburgh Steel Co.

N. F. Melville has been appointed Manager of Manufacturers Wire and Stainless Steel Wire Sales of Pittsburgh Steel Company, Pittsburgh, Pa. Mr. Melville received his technical training in Metallurgy at Carnegie Institute of Technology after which he joined the Metallurgical Staff at Carnegie Steel Company, Homestead Works, (now Carnegie-Illinois Steel Corporation). In 1921, he became Chief Metallurgist of Columbia Steel Company at Elyria, Ohio, and later at Pittsburgh for both Elyria and Butler Plants. In 1926, he joined Superior Steel Corporation at Carnegie, Pennsylvania, as Chief Metallurgist. He has been sales representative for Pittsburgh Steel Company since 1927, except for a period of about two years when he joined his former associates as Chief Metallurgist of Rotary Electric Steel Company, Detroit, Michigan.

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MR. Melville's background of training and experience enables him to combine with his sales work a technical service in metal working that for many years has been appreciated among steel and wire fabricators, and the present appointment will broaden his sphere of activities in this regard.

N. F. MELVILLE
Manager Manufacturers Wire and Stainless Steel Wire Sales, Pittsburgh Steel Co.

✦ ✦ ✦

E. J. Kopf Joins Republic Steel Advertising Staff

Elmer J. Kopf, since 1933 Manager of Advertising and Sales promotion, Union Drawn Steel Co., Massillon, Oho, has joined the staff of the Advertising Division, Republic Steel Corporation, Cleveland, O., according to an announcement by S. A. Knisley, Director of Advertising for Republic and subsidiaries.

✦ ✦ ✦

IN addition to enlarged duties in connection with Republic advertising, Mr. Kopf will continue to handle the advertising and sales promotion activities of Union Drawn Steel Co., a subsidiary of Republic. Mr. Kopf attended Case School of Applied Science and the Cleveland School of Art. Later he was associated for several years with industrial advertising agencies.

✦ ✦ ✦

American Welding Society Names W. S. Hays Manager

Warner S. Hays, Consulting Engineer of Philadelphia, has been appointed manager of the American Welding Society, 33 West 39th St., New York City. This announcement was made by Mr. A. E. Gibson, president of the Society.

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IN addition to having had many years' experience in the management of trade associations, Mr. Hays is a graduate of Yale Sheffield Scientific School, having specialized in electrical engineering.

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THE American Welding Society has gained 600 new members during the past six months and established several new local chapters. With the appointment of Mr. Hays as manager the Society is planning a broader scope of operation.

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James I. Nelson, Superintendent Hot Strip Mill, Bethlehem Steel Co.

JAMES I. Nelson has been appointed superintendent of Bethlehem Steel Co.'s hot strip mill at Lackawanna, N. Y., succeeding Clifford Fox, who was transferred to Bethlehem's new mill at Sparrows Point, Md.

(*Please turn to Page 441*)

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in May, 1937 and May, 1936
(In Gross Tons)

	MAY 1937	APR. 1937	MAY 1936
Wire rods	5,872	6,508	3,183
Strip steel	8,077	18,577	4,169
Plain, black or galvanized iron or steel wire	5,675	4,041	4,772
Barbed wire and woven wire fencing	4,086	3,400	3,395
Woven wire screen cloth	182	185	79
Wire rope	416	480	.....
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	850	845	326
Wire nails	1,980	2,096	786
Tacks	22	21	24
Other nails, including staples	256	204	242
Bolts, machine screws, nuts, rivets and washers	1,321	1,005	621
Total, these 11 classifications	28,737	37,362	17,597

Imports of Iron and Steel Wire Into the United States
(In Gross Tons)

Concrete reinforcement bars	771	586	682
Hollow bar and drill steel	273	254	192
Wire rods	1,293	1,751	1,690
Barbed wire	962	1,746	1,069
Round iron and steel wire	484	581	480
Telephone and telegraph wire	.....	.....	.....
Flat wire and strip steel	366	300	261
Wire rope and strand	306	396	163
Other wire	428	252	85
Hoops and bands	2,393	3,426	2,373
Nails, tacks and staples	1,159	2,686	1,595
Bolts, nuts and rivets	16	23	80
Total, these 12 classifications	8,451	12,001	8,670

Exports of Insulated Wire and Cable, May, 1937

	Foreign		To U. S. Possessions	
	Pounds	Dollars	Pounds	Dollars
Insulated iron or steel wire and cable	18,289	$ 3,722	6,263	$ 834
Rubber-covered wire	573,697	163,726	122,199	24,209
Copper weatherproof wire	132,721	27,300	88,020	18,488
Copper telephone cable	57,100	9,138	1,414	184
Other insulated copper wire	383,809	102,461	155,800	31,766
Nickle-chrome electric resistance wire	33,246	41,070	.....	.....
Total, these 6 classifications	1,198,862	$347,417	373,696	$75,481

Pig Iron Shipments Continue To Soar

IN May, the export trade showed increases (compared with the previous month) in 38 products, and declines in 31. Pig iron shipments continued at an unprecedented level, the total for that product registering the most impressive gain (79,421 tons). The next important increase was that in shipments of ingot, blooms, etc., (18,985 tons), followed by those in heavy rails (4,071 tons), welded black wrought-iron pipe (2,056 tons), and plain wire (1,207 tons). In all cases, May shipments of the items enumerated were comfortably in excess of those made in the like month of 1936. The outstanding decline (10,561 tons) was that recorded in exports of hot-rolled strip steel, others of moment occurring in black steel sheets (2,099 tons), tin plate (1,900 tons), and skelp (1,097 tons). Here again the trade in those items was higher than in May 1936.

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Pig Iron Again Leading Export Product

EXCLUDING scrap, pig iron was the leading product exported in May—from a tonnage standpoint—in a total trade of 117,598 tons (38,177 tons in April), going chiefly to Japan (71,378) the United Kingdom (29,415), Belgium (5,244), and Sweden (4,533). Then came tin plate (the leader from a value standpoint) whose aggregate of 28,415 tons (30,289 tons) went mostly to Japan (5,360), Portugal (3,213), Brazil (1,633), Canada (1,625), and Hong Kong (1,454) in a very widespread trade. Next in importance was unfabricated plate shipped to a total of 25,738 tons (26,880 tons), the outstanding markets being Japan (9,134), Canada (3,754), Sweden (2,907), China (2,352), and Soviet Russia (1,646). Then came ingots, blooms, etc., shipments reaching 24,816 tons (5,495 tons) and going principally to Japan (20,079), China (2,475), and Mexico (1,122). Following were black steel sheets in a widespread trade aggregating 23,747 tons (29,327 tons), the bulk being taken by Canada (6,475), Soviet Russia (3,377), France (2,526), Mexico (2,145), and China (1,430). Sixth was skelp whose total of 10,084 tons (11,181 tons) was taken principally by Canada (9,935).

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Far Eastern Purchases Much Higher

IN May, the Far East for the third consecutive month ranked as the leading purchasing area of semi-finished and finished iron and steel products shipped from the United States. In that month, it took 151,673 tons, or 45.8 percent of all shipments (37.1 percent in April). Europe ranked next in a trade aggregating 71,417 tons in accounting for 21.6 percent (14.8 percent), followed by North and Central America and the West Indies whose trade amounted to 65,908 tons or 19.9 percent (32.7 percent). Then came South America whose total of 35,378 tons made up 10.7 percent (8.9 percent) of all shipments made during the month. Africa's total—6,738 tons—represented 2.0 percent (3.2 percent).

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Japan Leading Individual Market

JAPAN in May supplanted Canada as the leading individual outlet with a trade aggregating 113,482 tons made up mostly of pig iron (71,378), ingots, blooms, etc., (20,079), unfabricated plate (9,134), tin plate and taggers' tin (5,360), wire rods (2,000), and black steel sheets (1,253). Then came Canada (40,717), the bulk of whose purchases was of black steel sheets (6,475), skelp (9,935), plain

(*Please turn to Page 434*)

(*Continued from Page 433*)

shapes (3,969), unfabricated plate (3,754), hot-rolled strip steel (2,857), and steel bars (2,778). Shipments to the United Kingdom (30,644) were practically all confined to pig iron (29,415). China took a total of 13,649 tons made up chiefly of ingots, blooms, etc., (2,475), unfabricated plate (2,352), black steel sheets (1,430), tin plate and taggers' tin (1,219), and plain shapes (1,095). Mexico's purchases (10,914 tons) were next in importance and the predominating items were black steel sheets (2,145), seamless casing and oil-line pipe (2,127), tin plate and taggers' tin (1,199), and ingots, blooms, etc., (1,122). Colombia ranked sixth receiving shipments to an aggregate of 10,100 tons, in which the outstanding items were heavy rails (2,952), welded black wrought-iron pipe (1,913), steel bars (888), and galvanized wire (314).

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Imports Lower In May

IMPORTS of iron and steel products in May (excluding scrap) aggregated 39,877 gross tons valued at $2,271,192 in comparison with 56,484 tons valued at $2,709,526 in the previous month—respective declines of 29.4 and 8.7 percent. Against the May 1936 totals of 43,696 tons valued at $1,766,599, although a 16.2 percent decline was recorded in quantity, there was an increase of 28.5 percent in value.

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Shapes Lead In May Trade

THE outstanding item received during the reviewed month—structural shapes, totaled 8,962 tons and came mostly from Belgium (7,863), and France (1,082). Pig iron (6,361 tons) ranked next and came chiefly from British India (4,274), and the Netherlands (1,541). Third in importance was 'other' pipe (4,076 tons), the bulk coming from Germany (3,567), Belgium (258), and Sweden (224). Solid and hollow bar imports totaled 4,036 tons, the outstanding suppliers being Belgium (2,595), France (749), and Sweden (517). Then came ferromanganese (2,427 tons) taken mostly from Norway (1,576), Canada (398), and Czechoslovakia (315). 'Other' hoops and bands ranked sixth in a trade aggregating 2,393 tons, the bulk coming from Belgium (1,633), France (456), and the United Kingdom (241).

✦ ✦ ✦

Belgium Maintains Leading Position In May

MAINTAINING its position as the chief supplier of iron and steel products (excluding scrap) to the United States, Belgium in May sent in 15,511 tons with shapes (7,763), solid and hollow bars (2,595), 'other' hoops and bands (1,633), sheets, skelp and sawplate (1,044), and concrete reinforcement bars (741) predominating. Germany—next—had a total of 7,148 tons made up principally of 'other' pipe (3,567), nails, tacks, and staples (744), barbed wire (647), and welded pipe (618). British India confined its entire trade (4,274 tons) to pig

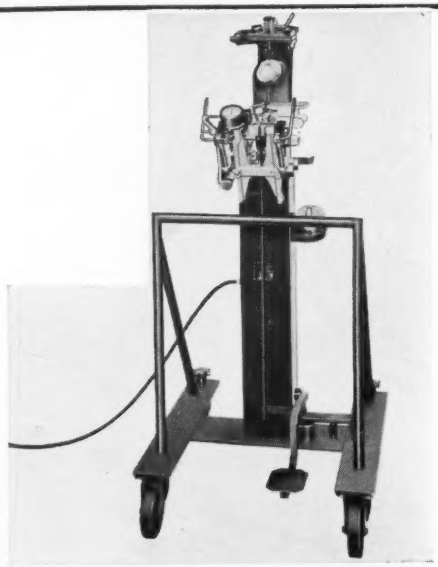
(*Please turn to Page 443*)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO, ILL.

Telephone State 7468 General Office and Factory, Peoria, Ills.

A Review of Recent Wire Patents

No. 2,082,301, HELICAL WIRE CURTAIN ROD, CLOTHESLINE AND THE LIKE, Patented June 1, 1937 by Edna Pearson, Liversedge, England.

The wire, making up this rod, has a straight exterior face, side faces at right angles to this face and a tapering inner face.

✦ ✦ ✦

No. 2,082,388, MACHINERY FOR MAKING WIRE FENCING, Patented June 1, 1937 by John B. Getz, Benjamin E. Getz, and John H. Leader, Morton, Ill.; said Leader assignor to said John B. Getz and to said Benjamin E. Getz.

A device is provided for severing a portion of the stay wire to provide a stay and liberate this from the remainder of the stay wire, and comprises a cutter and a cooperating shearing angle plate mounted adjacent an end face of a guide block in position to receive and support the wire in the angle thereof and oppose the cutter.

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No. 2,082,748, COMBINED SOCKET AND SLOTTED SCREW, Patented June 1, 1937 by Frank K. Brown, South Dartmouth, Mass., assignor to Continental Screw Company, New Bedford, Mass., a corporation of Massachusetts.

This screw has a socket, rectangular in cross section and slots at the corners of the socket.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

No. 2,082,906, COILING MACHINE, Patented June 8, 1937 by Willie E. Risinger, Minneapolis, Minn.

For forming a wire ring within a hole through a pad of paper, this inventor provides a driving gear wheel which is intermittently operated, a pair of gears driven by this driving gear, a pair of grooved discs operated by the gears, a mandrel having a grooved end to receive the wire which is forced longitudinally by the discs about the grooved mandrel and a cutting device for severing the wire.

✦ ✦ ✦

No. 2,083,092, SCREW, Patented June 8, 1937 by Joseph R. Richer, Detroit, Michigan.

The socket of this screw contains a number of alternating semi-cylindrical projections and depressions.

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No. 2,083,473, SCREW THREAD CUTTER ATTACHMENT, Patented June 8, 1937 by Hubert Riester, Collingswood, N. J.

More specifically, this screw thread cutter attachment is adapted for operation in connection with a lathe.

No. 2,083,555, SPRING FILLED MATTRESS OR CUSHION, Patented June 15, 1937 by Joseph W. Bowersox, Kansas City, Mo., assignor to Superior Felt and Bedding Company, a corporation of Illinois.

An enclosing casing is provided for the wire spring core, this casing being of a long rope-like pad extending along the outer sides of the border wire which connects the springs together.

✦ ✦ ✦

No. 2,083,810, UPHOLSTERY CONSTRUCTION, Patented June 15, 1937 by Albert M. Bank, Jersey City, N. J., assignor to Sylvia Bank, Jersey City, N. J.

The inventor has provided means for spacing and securing the individual wire springs making up the seat construction, including a rod having a humped portion for each spring, to which the springs are secured.

✦ ✦ ✦

No. 2,083,811, UPHOLSTERY CONSTRUCTION, Patented June 15, 1937 by Albert M. Bank, Jersey City, N. J., assignor to Sylvia Bank, Jersey City, N. J.

A number of straps are provided attached to the seat frame, each strap having a corrugated portion, with foundation springs mounted on the strap and coil tension springs attached to the

(Please turn to Page 436)

Announcing Over 10,000 Kw Installed!

Electric Lavite Furnaces are now operated by 200 typical progressive concerns:

FOR ANNEALING*
Rods and Fine Wire
Rivets and Stampings
Sheets and Tubing

FOR ALUMINUM HEAT TREATING*
At All Air Bases
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*(Names of users of typical Lavite Furnace Processes on request).

It is gratifying to have had a pioneer role with these organizations in creating new metal heating practices. We will gladly tell you how they may be applied to the heating of your metal products.

The Bellis Heat Treating Company
Branford, Connecticut
or
Lavite Limited, Low Moor Yorks, England

A Review Of Recent Wire Patents

(Continued From Page 435)

frame and to the straps, inwardly of the ends of the straps.

✦ ✦ ✦

No. 2,083,889, OXIDATION RESISTANT CABLE, Patented June 15, 1937 by Kenneth S. Wyatt, Detroit, Mich., assignor to The Detroit Edison Company, Detroit, Mich., a corporation of New York.

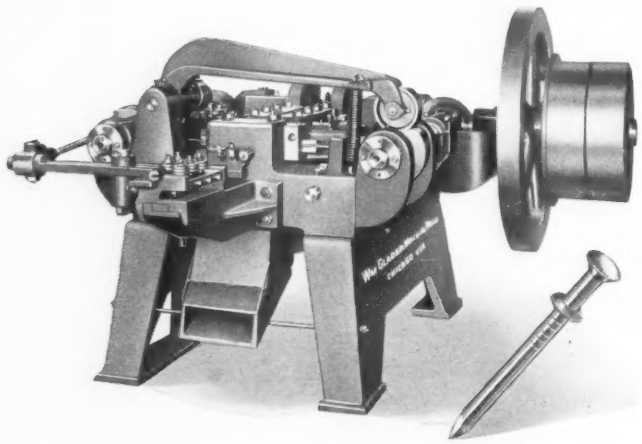
About the wire conductors are layers of insulation material with an antioxidant compound dispersed throughout the inner and outer layers of the insulation material only. An outside covering is, of course, provided for the cable.

✦ ✦ ✦

No. 2,084,078, METHOD OF MAKING SCREWS, Patented June 15, 1937 by Eugene E. Clark, Providence, R. I., assignor to American Screw Company, Providence, R. I., a corporation of R. I.

The method comprises upsetting a head on a suitable rod, forcing a punch into the head to form a recess therein, forming an arcuate junction between the walls of the recess and the upper surface of the head and simultaneously shaving the upper and lower surfaces of the head to finish the same.

GLADER WIRE NAIL MACHINERY



We Have Recently Made An Addition To Our Line Of Wire Nail Making Machinery.

The Machine Illustrated Above Produces The "Duplex" or Twin-Head Wire Nails.

For Further Information Address

WM. GLADER MACHINE WORKS

210 N. Racine Avenue,

CHICAGO, ILLINOIS

No. 2,084,079, SCREW, Patented June 15, 1937 by Eugene E. Clark, Providence, R. I., assignor to American Screw Company, Providence, R. I., a corporation of Rhode Island.

This patent covers the screw manufactured according to the method set out in patent 2,084,078.

✦ ✦ ✦

No. 2,084,146, STUD BOLT, Patented June 15, 1937 by Frederick E. Key, St. Louis, Mo., assignor to Key Company, East St. Louis, Ill., a corporation of Missouri.

The bolt has relatively coarse threads of high pitch on one end and relatively fine threads of low pitch on the other end. The construction also includes a nut threaded on the threads of low pitch which afford means for exerting high pressure by the nut when tightening in clamping relationship while the threads of high pitch permit easy removal of the bolt from its association with a suitable socketed device.

✦ ✦ ✦

No. 2,084,150, APPARATUS FOR COATING MATERIAL, Patented June 15, 1937 by Roger C. Lawrence, Ridgewood, N. J., assignor, by mesne assignments, to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

More specifically, the apparatus is provided for removing excess liquid coating from material while advancing from a liquid bath.

✦ ✦ ✦

No. 2,084,825, INSULATED WIRE, Patented June 22, 1937 by Samuel Ruben, New Rochelle, N. Y., assignor to Vega Manufacturing Corporation, Wilmington, Del., a corporation of Delaware.

This wire has an insulating coating containing a cellulose lacquer, a boron compound and a refractory insulating compound.

✦ ✦ ✦

No. 2,085,563, FLUID IMPREGNATED ELECTRIC CABLE, Patented June 29, 1937 by Frank L. Aime, New York, N. Y., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware.

Included in the construction of this cable is a series of comparatively loosely applied fibrous wrappings over shielding tape and sheathed in a copper sheath corrugated helically and radially to render the sheath flexible and provide means to expand and contract the sheath upon expansion and contraction of materials contained within the sheath.

✦ ✦ ✦

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS
17 East 42nd Street
New York City

'Round the World With the Wire Industry

New Steel In the United Kingdom

A DISCOVERY of a new steel known as "Stayblade Max" is reported to have been made in the **United Kingdom.** It is said to be suitable for working at temperatures up to and including red heat, to resist oxidation in air or steam up to temperatures as high as 900 degrees Centigrade and to be "quite machineable." It is used for boiler drums, turbines, high temperature reaction vessels, and other units of plant which have to operate at high temperatures and stress. It is reported to possess high chromium and nickel contents, and also substantial additions of titanium and aluminum. Its "time yield" value at 550 degrees Centigrade is as high as 9½ tons per square inch, so it is suitable for working under fairly severe stress at high temperatures, according to our information. It is of the austenitic type, and can be formed into various sections. In fact, it is already being tried in high temperature turbines in the form of blading, it is stated.

✦ ✦ ✦

Largest Electrically Operated Blast Furnace Commences Operation

IN the early part of May, the blast furnace of O. Y. Vuoksenniska A.B. at Imatra, **Finland,** started operations. This is said to be the largest electricially operated blast furnace in the world and consumes raw materials produced in Finland, exclusively. The average output is 100 metric tons of pig iron daily, (approximately 35,000 tons per annum), and is said to be comparable in quality to Swedish pig iron. The company is building a Bessemer and electric steelworks and a rolling mill which, under present plans, are to be completed by the close of the current year. In the beginning, the plants under construction will produce principally rails, girders, and other structural steel.

Stainless Steel Screens

STAINLESS steel is being used successfully in **England** in screens for dewatering coal, according to the London press. At one plant near Sheffield a wedge-wire screen first used for this work was made of ordinary brass, however results were not very satisfactory, the life of the screen being only about six months. Stainless screen was then tried and the initial cost was roughly five times that of the previous installation but the screen has now been working for eighteen months and apparently will last for several years longer.

✦ ✦ ✦

German Notes

THE shipping dates on all wire products remain very extended; particularly wire netting on which the shipping time is 18 to 20 weeks. The present quotation is about 79% off the British wire netting list as compared with 87 to 88% early last year. Prices for all wire products are unaltered. The quotation for wire rod remains very high and no order at less than £ (gold) 7.2.6 has been accepted in weeks. Prices in the Far East are £ (paper) 12.15.0—13.0 c. i. f. All wire products are in active demand except wire nails. The American steel strike has had an influence upon business as many cables were received from the United States in which immediate offers for wire rods were asked in the second week of June. However, no business, except that regularly executed, has been accepted as the industry is overstocked with orders.

✦ ✦ ✦

German Export Prices

THE average export price for wire machinery including wire nail making machinery per ton had been M 1.978 in 1935 and 2.128 in 1936. In this year the average price had been M 2.366 but due to the further increase of quotations during the past months it will be up again by M 125-150 in the next month's export figures. Domestic quotations are unaltered. The demand for all kinds of wire machinery for export is very active as the United States has contracted for certain quantities. The Latin-American markets have bought considerable quantities recently as did Japan. The wire machinery industry is working at nearly 100% capacity.

✦ ✦ ✦

PAINTING of barbed and other wire is rapidly entering German export practices. The barbed wire and wire reels of different sizes are painted with different colors; for example barbed wire of 12 G is usually painted with a green stripe, 12½ G with a red, 13 G with a blue, and 14 G with a brown stripe. The weight of the reels of 50—113 1/3 lbs. is marked with an additional color stripe. Thus any customer holding the color table can easily distinguish at once what sizes and lengths of reels he has to buy. The English industry is also introducing this practice. However, no international arrangement on this has as yet been undertaken so that it is possible that every country might issue a different color scale and confusion may arise as a result.

✦ ✦ ✦

THE demand for copper, brass, and other copper alloy wires, which had been very heavy during the months of April and May is lower and the prices have dropped. Twisted copper and bronze wire however are still in high demand particularly from abroad, and as a result prices are still high. A large part of the demand for this material is coming from the United States, mainly the West Coast markets, and some contracts have been recently booked for ¼" material twisted at S 376.—c.i.f. basis.

✦ ✦ ✦

THE export office of German wire rope and high tensile steel wire had to suspend temporarily all sales due to being overstocked with orders. Export quotations have again been advanced.

(*Please turn to Page 438*)

'Round the World With the Wire Industry

(Continued from Page 437)

Jelliff Purchases Wire Plant

THE C. O. Jelliff Mfg. Corp. of Southport, Conn., has recently purchased the Resistance Wire Division of George W. Prentiss and Co. of Holyoke, Mass.

Republic To Expand Gulf States Capacity

REPUBLIC Steel Corp., Cleveland, has announced an expansion program for its Gulf States Steel division, Gadsden, Ala., to cost about $2,000,000. Two 125-ton open-hearth furnaces will be added, increasing capacity of this department 50 per cent. These will cost $750,000. Contract for an addition to the open-hearth building has been awarded to Nashville Bridge Co., Nashville, Tenn., at $150,000. Sheet mill capacity will be expanded 50 per cent at cost of $1,000,000.

WIRE ASSOCIATION

Welcome To

THE

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OCTOBER 18th TO 23rd

When you come to Atlantic City, make your headquarters at the largest hotel nearest the auditorium . . . The Ambassador. You'll be adding hours of pleasure and enjoyment to your stay by being so close to everything that's going on. And The Ambassador is Atlantic City's finest hotel, located directly on the boardwalk with most guest rooms facing the Atlantic. You'll find everything you want at The Ambassador . . . comfortable rooms at moderate rates . . . fine restaurants . . . indoor swimming pool and other recreational facilities . . . spacious sun decks and public rooms. May we make a reservation for you now?

THE AMBASSADOR, ATLANTIC CITY

WILLIAM HAMILTON
Managing Director

HAROLD E. BAGGS
Convention Manager

✦ ✦ ✦

Bolt Threading Machine

OSTER Mfg. Co., 2057 East 61st Place, Cleveland, has recently developed an improved No. 915 single spindle Rapiduction bolt threading machine built for high production on standard runs in bolt plants and for increased production on a wide variety of special work. Regular bolt range covers all sizes from ⅜ to 1½-inch, at spindle speeds of from 49 to 298 revolutions per minute. Timken bearings are used throughout and die-head is of high quality hardened and ground tool steel.

✦ ✦ ✦

Scovill Manufacturing Buys Autoyre Co.

THE Scovill Manufacturing Co. has augmented its fastener and paper clip production department by the purchase of equipment, patents and good will of the Autoyre Company. A transfer of machinery is now under way. The Autoyre Company will continue operations in its present quarters.

✦ ✦ ✦

Nut Making Machine

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn., is manufacturing a new machine for use in the manufacture of the smaller sizes of hexagonal screw nuts from No. 0 to ¼-inch inclusive. Leaving a small amount of scrap, rough blanks are first cut from a coil of cold rolled steel or brass on a roll feed press equipped with gang tools. Blanks are squared up and forged on both faces to produce quickly and economically a smoothly-finished product. Machine will make double-chamfered blanks, or chamfered on one face only with either a

washer face, flat face or special face on the other side, depending on the tooling. Double hopper feeds and chutes which are provided are arranged to work alternately and deliver the blanks to the tools at a rate of 200 a minute. Lower ends of the chutes are hinged and swing toward the center of the machine, to carry the blanks into line with the central trimming die. There is a chamfering punch in the gate at each side of the trimming die, as well as two chamfering dies carried in a cross slide. By this arrangement, one blank is being trimmed while another is being chamfered at the right and a third feeding from the left-hand chute. On the next stroke, the chamfering and feeding are reversed. Machine will handle a maximum blank $\frac{3}{16}$-inch thick and $\frac{7}{16}$-inch across flats, different chutes and tools being used for each size nut. Scrap and work are delivered into separate boxes, while a force-feed coolant system is also provided. Taking a floor space of 47 x 52 inches, machine requires a 3-horsepower motor.

✦ ✦ ✦

Cable For Direct Burial In The Ground

THE Anaconda Wire and Cable Company has just issued a 20 page publication describing non-metallic sheathed cable for direct burial in the ground.

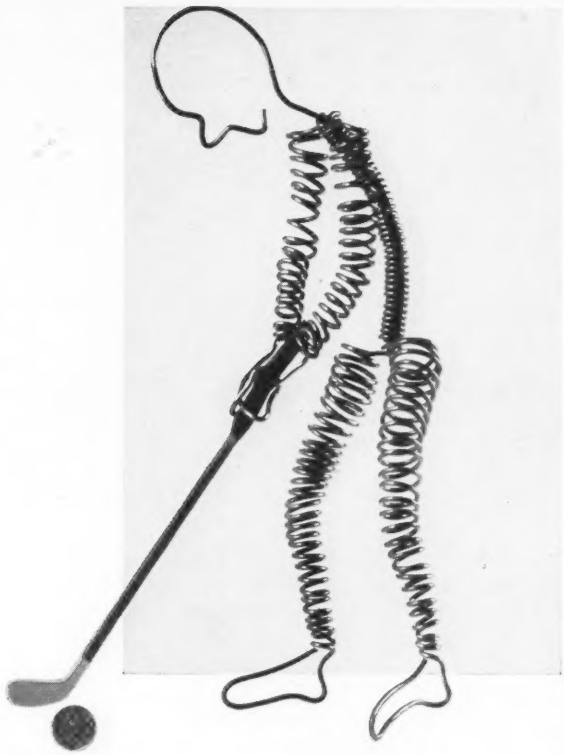
✦ ✦ ✦

IN addition to complete descriptions of the types available and their uses, helpful information relating to the application, installation and other engineering data is included.

✦ ✦ ✦

THIS publication, entitled ANACONDA DURASEAL CABLE —publication No. C-27, can be secured by writing to the Anaconda Wire and Cable Company, 25 Broadway, New York, N. Y.

Make your plans now to attend the Wire Association meetings, Atlantic City, N. J. Oct. 18-22, 1937



Wire that shoots Par in Your Plant

Your production schedule probably doesn't allow for handicaps. There's no place for breaks, delays, rejections and sluggishness the way you play the game. So we suggest Keystone wire. It's a par player . . . and right at home in your plant. Keystone provides wire exactly suited to your requirements . . . made to order if need be . . . and always of dependable uniformity. If you're using a wire that gets into the rough occasionally . . . or if you're interested in cutting a few strokes from your production score . . . write to Keystone.

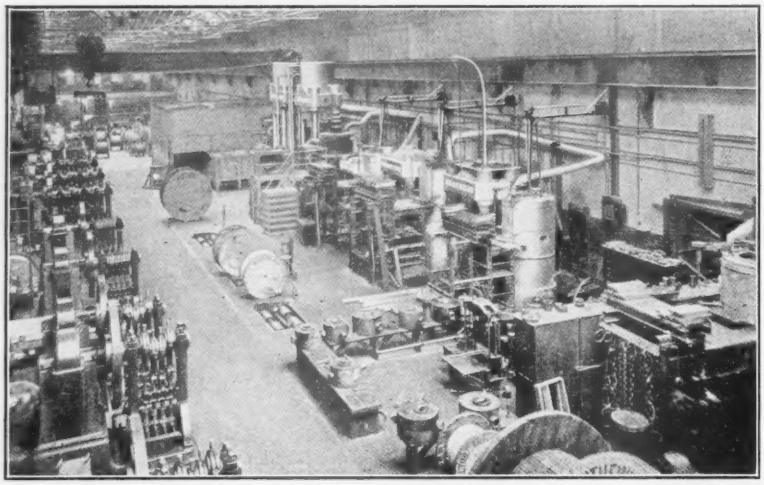
KEYSTONE

STEEL & WIRE CO. Dept. W, Peoria, Illinois

HIGH CARBON or LOW CARBON

SAMSON SPRING WIRE — KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Bright . . . Tinned Coppered Annealed Galvanized



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SUMITOMO CABLES
LIL JE HOLMENS
LIGNES TEL. & TEL.
KABEL POLSKI, etc.

. . . all are users of the equipment with the international reputation — ROBERTSON!

At home or abroad, Robertson equipment is seen where production - thrifty management and high standards of Uniform Quality have contributed to outstanding successes. They have been adjuncts of leadership for a great many years.

Why not investigate their proven advantages?

John ROBERTSON CO. INC. Pioneers~Since 1858

125-37 Water Street Brooklyn, N. Y.

Aluminum Coated Steel

(*Continued from Page 417*)

to take the place of tin plate and galvanized iron", being "more resistant to corrosion and acids than either of the two older products."

✦ ✦ ✦

TEMPERATURES much higher than can be withstood by tin and zinc coated steel are readily resisted by aluminum steel, according to Dr. Fink. In both sheet and wire form, the new material may be brought, it was found, to the white heat of 1,800 degrees Fahrenheit and maintained at that temperature for 1,000 hours. The melting point of tin is 450 degrees Fahrenheit and that of zinc is 784 degrees Fahrenheit.

✦ ✦ ✦

DR. Fink's invention may be a boon to the speed and endurance of airplanes, automobiles and other machines which must withstand the shock of constant vibration. The low weight of metal coating required per unit weight of steel reduces the size of the cross-section of an airplane part, for example, and means a corresponding reduction in wind resistance.

✦ ✦ ✦

OTHER inventors in coating steel satisfactorily have all failed to appreciate either that aluminum oxide is not reduced by ordinary hydrogen or that the interposition of oxide between the steel and the aluminum prevents perfect adhesion.

✦ ✦ ✦

THE new composite metal will find application in bridge construction. Aviation companies and machine manufacturers have already undertaken experiments to test the invention. It is expected that the product, transformed into fly screen, will soon be marketed as the foundation for theatre curtains.

The 1937 Meeting of
the Wire Association
Will be Held at
Atlantic City, N. J.
October 18 to 22, 1937

Outstanding Personalities of the Wire Industry

(*Continued from Page 432*)

M. E. Nichols Sup't Of Training Of American Steel & Wire Company

MAURICE E. NICHOLS for the past eight years Dean of Fenn College, Cleveland, has joined the American Steel & Wire Company as superintendent of Training, it was announced by E. W. Kempton, director of industrial relations, in whose department Mr. Nichols will serve. He will supervise the company's training activities throughout the country.

✦ ✦ ✦

R. C. Wilmot, Managing Engineer, General Electric Co.

R. C. WILMOT has been appointed managing engineer for wire materials of the Bridgeport plant of General Electric Co. He will supervise both engineering and manufacturing of wire products, H. H. Watson was named designing engineer for wiring devices and C. H. Barker, supervisor of production.

✦ ✦ ✦

AN expansion program at the Bridgeport works which will increase manufacturing facilities over 50 per cent by August 1 also has been announced by C. W. Wilson, vice president.

✦ ✦ ✦

Jones & Laughlin Steel Corp. Announces Change In Personnel

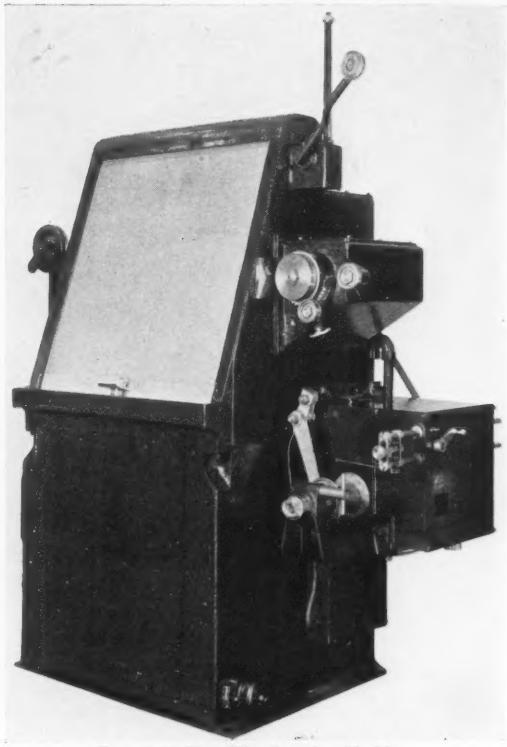
W. W. WHITNEY has been named assistant chief industrial engineer in the production department, Pittsburgh works, Jones & Laughlin Steel Corp. **J. E. Beck** has been appointed metallurgist at the Pittsburgh works, and **A. A. Archibald** has been appointed assistant metallurgist. **Y. J. Bruce** has been transferred to the general metallurgical department, working on cold finished products.

✦ ✦ ✦

MR. Whitney started with the company in February, 1924, as a draftsman. Mr. Beck came with Jones & Laughlin in September, 1927, in the metallurgical de-

(*Please turn to Page 442*)

HIGH SPEED WIRE DRAWING EQUIPMENT



Type A-16 Fine Wire Drawing Machine.

FOR TYPE A — FINE WIRE

Size of finished wire	No. 34 to No. 46 B & S gauge
Number of operating dies	16 (minimum slip)
Speed of finished wire	up to 6000 F. P. M.
Motor size	3 to 5 H. P. (located under machine)

FOR TYPE B — COARSE FINE WIRE

Size of finished wire	No. 26 to No. 34 B & S gauge
Number of operating dies	16 (minimum slip)
Speed of finished wire	up to 6000 F. P. M.
Motor size	5 to 10 H.P. (located under machine)

A COMPLETE line, minimum slip, built primarily for high speed drawing — built for long life, efficient operation, economical production and clean and excellently wound quality wire.

High Speed Insulating Machines For Use With Paper — Cotton — Silk

Saturating and Finishing Equipment For Weatherproof and Code Wire

Taping Machines for Cambric and Paper, etc.

Take-ups — Spoolers — Coilers

Complete Tinning Equipment

Other Equipment for Producing Wire and Cable

Let us show you what our equipment can do towards cutting production cost and improving quality.

ELEVATOR SUPPLIES COMPANY, Inc.

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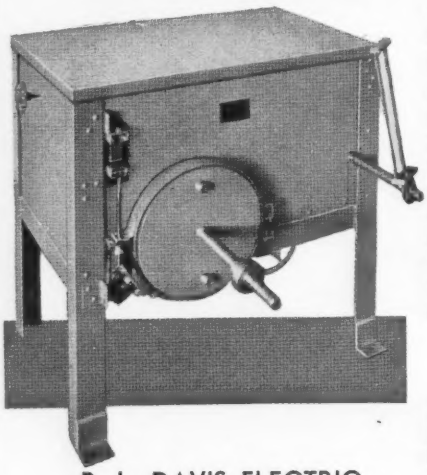

R. L. DAVIS ELECTRIC COMPANY, INC.
WALLINGFORD, CONN.

EUROPEAN AGENTS
SELSON MACHINE COMPANY
LONDON, ENGLAND

THE Take-Up is built of welded angle iron entirely enclosed by sheet iron sides and cover. A 1200 R.P.M. ball bearing polyphase motor drives the main shaft through a pinion and spur gear. The gears are oversize to withstand the shock of sudden stopping, and the main shaft is supported by heavy duty ball bearing pillow blocks from which a pair of mitergears drive a hardened steel worm and wheel directly connected to a cam which traverses the wire on the reel.

+ + +

BY inserting the driving dogs into the cast iron brake drum, the brake drum and the driving dogs are combined; thus, the entire shock of the braking is confined to the brake drum and is not transmitted through the keyways and gears back to the motor. The brake adjustment is simple because the brake is outside the machine.

+ + +

Scott Testers

Recording Tensile Machines from 1-5 lb. (100 grams) to 2000 lbs. maximum.

Special Equipment manufactured to meet special conditions.

We are the originators and hold basic patents on the use of the inclinable plane for tensile and hysteresis fatigue tests.

Scott Testers are the universal standard.

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Providence, R. I., U. S. A.

Harnischfeger Names Hoskins For Smootharc Welder And Wire Sales In Philadelphia Territory

G. W. HOSKINS, recently with Lincoln Electric Company, has joined the Harnischfeger Corporation of Milwaukee as sales engineer for Smootharc Welder and Weld Rods in the Philadelphia territory. Widely acquainted with men interested in the technical side as well as the merchandising of welder and weld rods in this territory, Mr. Hoskins has, in addition to his six years' experience with the Lincoln Electric Company, also worked as welding inspector on 100 miles of 8" pipe line for the Sun Oil Company. Previous to this time he worked as a welder operator on tank contruction for six months in Charleston, W. Va. His practical experience also includes several months in general shipyard welding on the east coast. This combination of practical welding experience combined with years of sales experience will stand him in good stead in his new connection.

Outstanding Personalities of the Wire Industry

(*Continued from Page 441*)

partment. Mr. Archibald, after five years as a field engineer, joined the company in April, 1935. Mr. Bruce started with Jones & Laughlin in June, 1923, as an inspector in the Pittsburgh works metallurgical department.

+ + +

G. N. Humphrey Named Phelps-Dodge Director

GEORGE N. Humphrey, president of M. A. Hanna Company has been elected a director of Phelps-Dodge Corporation. The Hanna company some two years ago announced acquisition of a large block of stock of Phelps-Dodge, a leading copper producer.

+ + +

MR. Humphrey is chairman of the executive committee of National Steel Corporation of which M. A. Hanna Company is probably the leading shareholder. He is a director of the National City Bank and of Industrial Rayon.

+ + +

R. M. McCulloch To Head Purchasing Department

R. M. McCulloch, who has been connected with the purchasing division of the International Harvester Company for the past 33 years, was made manager of the purchasing department effective July 1st, with headquarters in Chicago. Mr. McCulloch began work for the company in its Hamilton, Ont., plant in 1904, and in 1926 was made assistant manager of purchasing, which position he held until his recent promotion.

Manufacturers of materials, tools and equipment for wire drawing and forming plants are constantly making improvements and additions to their lines. If you do not find the product or service in which you are interested, additional information will be supplied promptly. Simply address:

WIRE & WIRE PRODUCTS
17 East 42nd St. New York City

Exports and Imports of Wire

(*Continued from Page 434*)

iron, while Sweden in a more varied trade accounted for 3,540 tons, the outstanding items being wire rods (1,144), solid and hollow bars (517), round iron and steel wire (343), sponge iron (302), and flat wire and steel strips (294). Then came France's total (2,548 tons) made up mostly of shapes (1,082), solid and hollow bars (749), and 'other' hoops and bands (456). Canada ranked sixth in a trade aggregating 1,971 tons, the bulk accounted for by spiegeleisen (587), pig iron (446), ferromanganese (398), and ferro-silicon (207).

✦ ✦ ✦

CARD CLOTHING RECEIPTS amounted to 28,867 square feet valued at $45,271 (34,922 square feet and $40,734) and were furnished by the United Kingdom (26,963 square feet; $41,311), Belgium (1,260 square feet; $2,063), Germany (383 square feet; $813), and Switzerland (261 square feet; $1,084).

✦ ✦ ✦

RECEIPTS of WIRE HEDDLES amounted to 714,000 pieces (656,000 pieces) and were received from Japan (500,000), Germany (194,000), and Switzerland (20,000).

✦ ✦ ✦

AN aggregate of 109,833 square feet of WIRE CLOTH AND SCREENING was received from Germany (90,044), the Netherlands (15,572), and Canada (3,072). In April the total was 144,332 square feet.

✦ ✦ ✦

NO trade occurred in WIRE FENCING AND NETTING of the galvanized before weaving grade (980,825 square feet in April). Of that galvanized after weaving, a total of 1,761,900 square feet (4,638,350 square feet) came in from Belgium (817,450), Germany (702,000), the Netherlands (227,250), and the United Kingdom (15,200).

(*Please turn to Page 449*)

The Latest GENERAL CATALOG on Corrosion - Resisting Alloys and Equipment

Write for it today.

You can use this catalog for reference in working out corrosive fluid and gas handling problems.

The catalog contains a description of the various Duriron Company corrosion-resisting alloys—Duriron, Durichlor, Durimet, Durco Stainless Steels, Alcumite—with their physical and chemical characteristics.

Where feasible and applicable, sizes, working dimensions and capacities have been stated.

This catalog will be extremely useful. It is available on request. Write for your copy today.

THE DURIRON COMPANY, Inc.

445 N. Findlay St. Dayton, Ohio

STEEL WIRE

By MAURICE BONZEL

A NEW BOOK ABOUT WIRE!

THIS complete treatise on every phase of the manufacture of high and low carbon steel and ferrous alloy wires now available in English, in a limited edition . . . The author, trained as a metallurgist, is general manager of a large wire mill in France. He has taken full advantage of his unique opportunities.

495 pages. 414 charts, photomicrographs and illustrations

Translated and Published by Kenneth B. Lewis, Consulting Engineer
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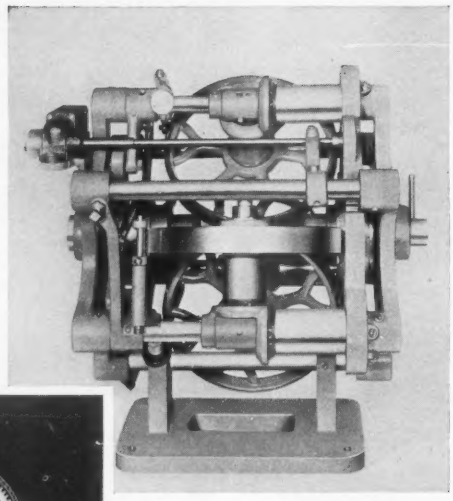
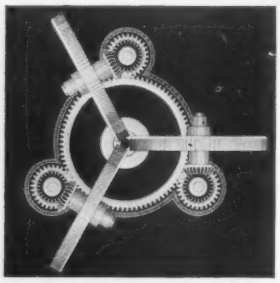
ACCURATE MEASURE

. . . this is the measuring machine you *must* use. Shows *exact* linear measurement of bare, insulated, twisted pair, oval, odd-shaped, cable. Absolutely accurate at any speed! Speeds up production; saves loss and waste.





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Inquiries and your fullest investigation invited.

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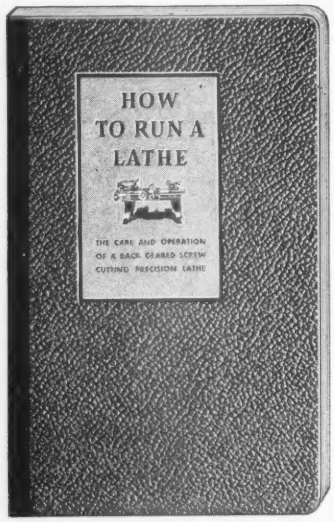
LYONBILT SPECIAL MACHINERY

BROCKTON · MASSACHUSETTS · U. S. A.

How To Run A Lathe

THE 33rd edition of the well-known machinists' manual, "How to Run a Lathe", has recently been announced by its publisher, The South Bend Lathe Works, South Bend, Indiana. The new edition of "How to Run a Lathe" has 160 pages containing the latest and most authoritative information about the fundamental operations of modern lathe practice. Instructions on every phase of lathe work are given in detail in easily understandable language and accompanied with more than 300 illustrations.



✦ ✦ ✦

THE book is used as a handy reference by all engaged in metal working operations. The instruction it contains has proved a great boon for the homeshop enthusiasts and hobbyists, anxious to expand their interest into metal working projects, but more or less unacquainted with the use of metal working equipment.

BESIDES dealing with all types of lathe work and showing the proper setup for doing every kind of a lathe job, the book also includes a great amount of useful shop information of a general nature, such as: reference tables and formulae, tables of cutting speeds of metals, application of lathe tools, cutting screw threads, metric screw threads, taper turning and boring, milling and keyway cutting, bushing work, gear cutting, proper application and types of drives, shop hints and short cuts, etc.

✦ ✦ ✦

COPIES are priced at 25c each, and will be mailed postpaid anywhere in the world. Stamps or coin of any country are accepted. A copy may be obtained by writing to this magazine.

✦ ✦ ✦

Ford Purchases Westinghouse Bell Type Furnaces

BASED on the excellent performance record of the twelve Westinghouse bell type annealing furnaces they now have in service, the Ford Motor Company has purchased twelve additional Westinghouse bell type furnaces for annealing automobile body stock. Each furnace will be rated at 230 Kw., with a capacity for annealing two coils 52″ in diameter, 48″ in height, giving a total loading of 32,000 pounds per charge.

✦ ✦ ✦

THIS additional installation of twelve bell type furnaces will give the Ford Motor Company a total of 38 bell annealing furnaces, 24 of which are Westinghouse.

THERE WILL BE A REGISTRATION FEE OF $5.00 FOR THOSE ATTENDING THE WIRE ASSOCIATION TECHNICAL SESSIONS AND INFORMAL MEETINGS

ADMISSION WILL BE BY BADGE ONLY

✦ ✦ ✦

To Those Registering and Attending the Meetings, stenographic copies of the discussions will be available without additional cost.

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Costs

Carboloy Company Presents Carboloy-tipped Centers

Carboloy Company, Inc., manufacturers of cemented carbide tools, dies, and wheel dressers, announces a special application of Carboloy on lathe and grinder centers. These centers are the same as regular steel centers except that a Carboloy cone-shaped tip is substituted for the ordinary steel tips.

✦ ✦ ✦

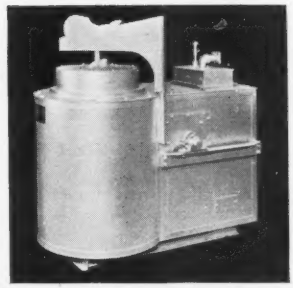
REPORTS to date by users show that these centers wear 50 times longer than ordinary centers. A recent test shows this wear resistant quality. Using No. 72 steel shot at 100 lbs. pressure, a bar of Carboloy ⅜" square was blasted for 40 minutes. At the end of this period it showed no appreciable wear although its surface finish was slightly dulled. As

compared to this, a bar of steel of the same size, and having a hardness of 65 Rockwell "C", was blasted for the same period. At the end of 40 minutes 50% of its area at the point of blast had worn away. This is an excellent indication of the extreme wear-resistant qualities of Carboloy cemented carbide.

✦ ✦ ✦

BECAUSE of their diamond-like hardness, cemented carbides are ideally suited to resist the extreme wear on lathe and grinder centers,—particularly where the work is nitrided, case hardened, or heat treated shafts. One report shows that on a turning operation, SAE-2335 steel shafting, Carboloy centers stood up 3 years with one regrinding whereas ordinary centers lasted only one week. Besides its longer life, users report greater accuracy, elimination of burning and scoring, and fewer reconditionings. The centers are available in all sizes, finished complete, ready for use.

MAKE YOUR PLANS NOW TO COME TO THE WIRE ASSOCIATION MEETING ATLANTIC CITY, N. J., OCT. 18 to 22.



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Revolutionary advance in furnace design which gives new high efficiency in production.

Cyclone action forces heat directly through the densest charge, producing increased speed and uniformity in tempering.

Cyclone construction withstands unusual abuse, reducing production delays and maintenance costs to a minimum.

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for heat treating
WIRE

Improved physical properties, dependable uniformity, cleaner surface of the product—these advantages in addition to the lowest operating cost per ton of production have caused many of the largest wire mills in this country to standardize on Surface Combustion gas-fired furnaces. SC furnaces for heat treating wire include patenting, annealing, hardening, spheroidizing and galvanizing equipment. For producing controlled atmospheres, SC DX gas preparation units are available in 250 to 20,000 cu. ft. per hour capacities, and may be used with present furnaces by providing a muffle for the work. Ask for further information.

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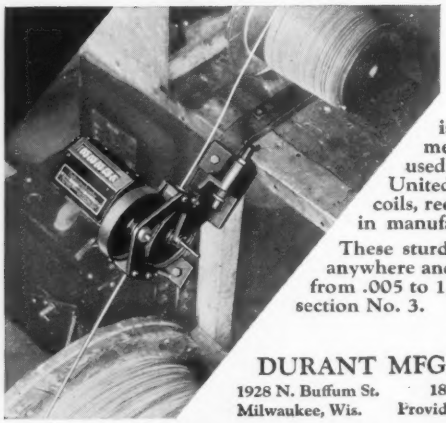

THE ONLY WAY TO MEASURE WIRE ACCURATELY

is to run it through a dependable wire measuring machine. *Productimeters* are used in most of the wire plants of the United States for getting accurate footage on coils, reels, and spools, measuring off wire, and in manufacturing wire products.

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BALLOFFET

The Quality Diamond Dies
Since 1870

Balloffet Dies and Nozzle Co., Inc.

45-47 Adams Street — Guttenberg, N. J.

New Special Atmosphere Furnace

(*Continued from Page 411*)

to temperature, and soak at that temperature, respectively.

✦ ✦ ✦

CONTROL of the temperature in each zone is maintained by means of automatic pyrometer type instruments which are in turn influenced by standard bimetallic thermocouples which extend down through the arch of the furnace with the junction as close to the work as clearance will allow. The pyrometer equipment is arranged for both recording and indicating, and temperatures common to the brass and copper base alloy industry are easily maintained within the furnace.

✦ ✦ ✦

Power For Heating Grids

POWER to the heating grids within the furnace is taken from a battery of transformers connected directly to the plant 440 volt, 3 phase, 60 cycle line. Adequate electrical equipment for the safe conduction and control of this current have been provided.

✦ ✦ ✦

Operation Of The Furnace

IN practice, coils of material are piled upon one of the trays at the charging end of the furnace. This tray is then pushed into position before the hydraulic ram and at the proper time interval a solenoid valve directs the pushing stroke. For all practical purposes the line of trays through the equipment may be said to be moving continuously at the rate of about 1″ per minute, depending on the cycle necessary for the proper heat treatment of the material being run. As trays of material are ejected at the discharge end of the furnace they are unloaded by the operator and returned to the charging end of the furnace ready for reloading. The discharged material comes from the furnace at a temperature much below that at which oxidation of the material may take place, and at which material is easily handled by the operator without gloves.

Finish Of Material

IT is noteworthy that material consisting of brass and bronze wire in coils or strip stock of these materials when charged into the furnace clean is uniformly annealed and discharged from the furnace as bright or brighter than before heat treatment. Material containing relatively high percentages of tin and zinc are produced scale-free with only slight discolorations caused by the volatilization of zinc or tin and are easily brought to finish appearance by flash pickling.

✦ ✦ ✦

Capacity

THE furnace has capacity for annealing 1000 lbs. per hour. Both the furnace and the equipment for producing the special protective atmosphere used in the furnace were designed and built by The Electric Furnace Company of Salem, Ohio, whose contributions in research on bright annealing, brazing and scale-free heat treatment are to be found embodied in practically every phase of modern industry.

✦ ✦ ✦

E. I. du Pont Handbook On Neoprene

NEOPRENE, an engineering material with rubber-like properties, yet one which resists the deteriorating effects of oil, heat, sunlight, chemicals and oxidation, is described in detail in a new handbook published by Rubber Chemicals Division, E. I. du Pont de Nemours & Company. This presentation considers separately the effects of various types of oils, acids, sunlight, heat and other forces which result in rapid deterioration of rubber products and indicates the type of service which may be expected with a similar part of neoprene.

✦ ✦ ✦

SPECIFIC applications of neoprene, including hose, electrical cable, molded parts, extruded material, sheet goods and gaskets are also described, with data on reasons for the use of neoprene in these applications. Of special interest is a summary of the method of making neoprene and its chemical composition.

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Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

Write for further information. We may be able to solve your difficulties.

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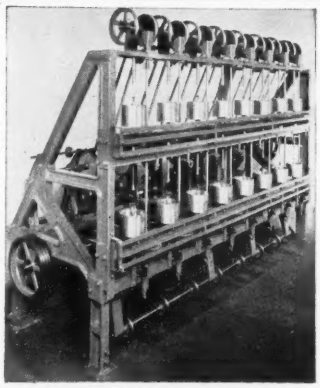

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Simple in construction, high speed production, moderate in price, and costs little to operate. Ball bearings throughout, helical gears, Vee belt spindle drives, minimum floor space.
Versatile—applying cotton, silk, paper, and transparent film such as "Cellophane", with equal facility and at high speeds.
Production figures gladly furnished.

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Straightener Specialists Since 1866

The 1937
Wire Association Meeting
Will be Held at
Atlantic City, N. J.
October 18th to 22nd, 1937

New Continuous Rod Mills American Steel & Wire Co.

(*Continued from Page 405*)

on this type conveyor for approximately 12 minutes by which time it is cool enough to be transferred to the hook conveyor. Two hook conveyors are provided, one for each mill. One conveyor is considerably longer than the other and is used on the mill which will roll a variety of sizes to be used for special purposes, requiring additional inspection and trimming before shipment. The mill with the short conveyor will roll a #5 rod at all times. Through the use of an adjustable speed motor, the speed of the hook conveyor can be varied from 9 to 27 ft. per minute and is set to give the bundles time to cool to air temperature before they reach the inspection platform. This takes from 40 to 60 minutes. Special cranes load the rods into cars or trucks for shipment. They are arranged so that the rods are loaded in such a manner as to facilitate unloading by means of crane and hook.

✦ ✦ ✦

Oiling System

THE mill is equipped complete with oiling system, having sight flows for all bearings and sprays to the gears. It is located in the basement or rather, on the first floor, since the mill itself is located 14 ft. above the ground level. Furnace recuperators, reel drives, electric controls, return conveyor chains, and all such equipment as was heretofore either placed on the mill floor or in balconies and pits, are therefore located on the ground level.

✦ ✦ ✦

Power

LOCAL power companies supply power at 6600 volts for the mill. Direct current is supplied by a 4-unit motor-generator set, one generator furnishing direct current for general use, the other two generators furnishing direct current power to the reel motors which must be run absolutely in step with the mill at the final pass. Each mill is driven by a 4500 H. P. synchronous motor.

✦ ✦ ✦

Water Supply

WATER is obtained from the existing aqueduct, and passes through a self-cleaning strainer to the mill service lines. A new pump house was installed adjacent to the mill with two 6,000 gallons per minute centrifugal pumps, either one of which will furnish all the water required by both mills.

✦ ✦ ✦

Noise Abatement

NOISE measurements made here by sound engineers disclosed an average noise level of 79 decibles. This level of noise is about equal to that of heavy street traffic and the equivalent also of an ordinary domestic vacuum cleaner at a distance of about two feet.

✦ ✦ ✦

THE anti-friction bearings installed in the rolling equipment of these new mills are responsible for the reduction of noise. Workers and officials of long experience in the steel industry hold that these mills are twice as quiet as the old.

✦ ✦ ✦

Simplified Practice Recommendation R166-37, Color Code For Marking Steel Bars, Now In Print.

THE Division of Simplified Practice of the National Bureau of Standards has announced that printed copies of Simplified Practice Recommendation R166-37, Color Code for Marking Steel Bars, are now available. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents each.

✦ ✦ ✦

THE recommendation, which was proposed and developed by the National Committee on Iron and Steel of the National Association of Purchasing Agents, is limited to a color code for marking commonly used grades of steel, as represented by S. A. E. numbers.

FOLDED PAPER FLATS
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TWISTED "CELLOPHANE" YARNS
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Well experienced in design, manufacture and sale of mechanical springs. Can set up and operate spring division. Chance for company desiring to design and manufacture springs for sale or own use. Good background and education. Up to date in stress and fatigue consideration for all alloys.
Address reply Box 26 c/o
WIRE & WIRE PRODUCTS.

Exports and Imports of Wire

(*Continued from Page 443*)

THE May total for FOURDRINIER AND OTHER PAPER-MAKING WIRES was 30,888 square feet in comparison with 51,912 square feet in April and was taken from Austria (12,108), France (9,578), and Germany (9,202).

✦ ✦ ✦

EXPORTS of iron and steel wood screws during May, 1937, totaled 48,772 gross valued at $8,203. Of this total the Philippine Islands took 13,309 gross valued at $1,464; Cuba 5,808 gross valued at $835; Chile 4,486 gross valued at $494; Colombia 3,881 gross valued at $492; Panama 3,125 gross valued at $1,053; Canada 2,928 gross valued at $952; Japan 2,450 gross valued at $839.

✦ ✦ ✦

EXPORTS of brass wood screws during the same month totaled 15,310 gross valued at $355. Of this total Argentina took 6,127 gross valued at $160; Cuba 2,010 gross valued at $461; Australia 1,437 gross valued at $761; Canada 1,356 gross valued at $734; Costa Rica 969 gross valued at $714.

✦ ✦ ✦

IMPORTS of wood screws during the same month totaled 45,154 gross valued at $2,621. Of this total Japan supplied 28,650 gross valued at $1,452; Belgium 14,600 gross valued at $927; Sweden 1,070 gross valued at $115; United Kingdom 520 gross valued at $49.

FOR SALE:
Bellis Salt Annealing Furnace for wire rods and wire. Complete with all equipment for electric immersion heating.
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Continuous Straightening and Cutting Machinery
With
FLYING SHEAR
for round and shaped wire.
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CRANES—Cleaning House
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

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Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., The, Stamford, Conn.
Vianney Wire Die Works, New York, N. Y.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Co., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., The, Stamford, Conn.
Vianney Wire Die Works, New York, N. Y.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Union Wire Die Corp., The, Stamford, Conn.
Vanadium Alloys Steel Co., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.

BUYERS' GUIDE, Continued

Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., New York, N. Y.
Vanadium Alloys Steel Co., North Chicago, Ill.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES—
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEER—Consulting Wire Mill
Gould, William, New York, N. Y.
Lewis, Kenneth B., New York, N. Y.

EQUIPMENT—Insulation Testing
Leeds & Northrup Co., Philadelphia, Pa.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FURNACE CONTROLS — Combustion
Leeds & Northrup Co., Philadelphia, Pa.

FURNACE CONTROLS—Draft
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Annealing
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Automatic
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Bright Annealing
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Electric
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.

FURNACES—Hardening and Tempering
Electric Furnace Co., Salem, O.
Leeds & Northrup Co., Philadelphia, Pa.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
John Robertson Co., Brooklyn, N. Y.
Surface Combustion Co., Toledo, O.

FURNACES—Non-Oxidizing
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

FURNACES—Normalizing
Leeds & Northrup Co., Philadelphia, Pa.

FURNACES—Wire, Strip & Sheet
Bellis Heat Treating Co., Branford, Conn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., Chicago, Ill.
Surface Combustion Co., Toledo, O.

GEARS—Wire Mill
Farrel-Birmingham Co., Ansonia, Conn.

GRINDERS—Roll
Farrel-Birmingham Co., Ansonia, Conn.
Norton Co., Worcester, Mass.

HANDLING EQUIPMENT — Material
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

HOISTS—Electric Traveling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.

INSTRUMENTS—Electrical
Leeds & Northrup Co., Philadelphia, Pa.

INSULATION — Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Warner Company, Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Magnus Chemical Co., Garwood, N. J.

LUBRICANTS—Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
Elevator Supplies Co., Inc., Hoboken, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Enameling
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
Royle, John & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, etc.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Material Handling
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MACHINERY — Measuring Wire & Cable
Davis, R. L., Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis., and Providence, R. I.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works Co., Chicago, Ill.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
Farrel-Birmingham Co., Ansonia, Conn.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
Amer. Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc., Hoboken, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY— Special — Combination Machine for Drawing, Cutting-to-length. Straightening and Reeling Bars from Coil in One Operation (Schumag Type)—
W. A. Schuyler, New York, N. Y.

BUYERS' GUIDE, Continued

MACHINERY—Spooling
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
Lewis Machine Co., The, Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
W. A. Schuyler, New York, N. Y.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
Elevator Supplies Co., Inc., Hoboken, N. J.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Size of Wire
Davis, R. L., Electric Co., Wallingford, Conn.

MACHINERY—Testing Wire
Henry L. Scott Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Fall, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc., Hoboken, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Amer. Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, O.
Elevator Supplies Co., Inc. Hoboken, N. J.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
W. A. Schuyler, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
Amer. Insulating Mach'y Co., Phila., Pa.
Elevator Supplies Co., Inc. Hoboken, N. J.

MACHINERY—Wrapping Wire
W. A. Schuyler, New York, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Torrington Mfg. Co., Torrington, Conn.

MONORAIL SYSTEMS—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

OVENS—Annealing or Drying
Lindberg Engineering Co., Chicago, Ill.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

PATENT ATTORNEYS—
Lancaster, Allwin and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

POTS — Annealing, Case Hardening and Tempering
Lindberg Engineering Co., Chicago, Ill.

POTS—Lead Melting
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Hydraulic and Mechanical
Farrel-Birmingham Co., Ansonia, Conn.
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

PYROMETERS—
Leeds & Northrup Co., Philadelphia, Pa.

RECORDERS—
Leeds & Northrup Co., Philadelphia, Pa.

REEL AND TENSION STAND—
Sleeper & Hartley, Inc., Worcester, Mass.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Morrison Engineering Co., Cleveland, O.

RODS—Stainless Steel
Rustless Iron & Steel Corp., Baltimore, Md.

RODS—Wire—Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLLS—
Farrel-Birmingham Co., Ansonia, Conn.

RUST PROOF COMPOUND—
American Lanolin Co., Lawrence, Mass.

SHEET—Steel
Continental Steel Corp., Kokomo, Ind.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

SKIN PROTECTOR—
Magnus Chemical Co., Garwood, N. J.

SOAPS—Industrial and Wire Drawing
Magnus Chemical Co., Garwood, N. J.
R. H. Miller Co., Homer, N. Y.

STAINLESS STEEL—
Rustless Iron & Steel Corp., Baltimore, Md.

STRIP—Brass, Zinc and Non Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—Wire
Henry L. Scott Co., Providence, R. I.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Fall, O.

TUBE BENDERS AND FORMERS—
H. J. Ruesch Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Proof
Duriron C., The, Dayton, O.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
Amer. Insulating Mach'y Co., Phila., Pa.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Enameled For Coils
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification For Special Purposes
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Seymour Mfg. Co., Seymour, Conn.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Stainless Steel
Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Brass, Zinc
Platt Bros. & Co., The, Waterbury, Conn.

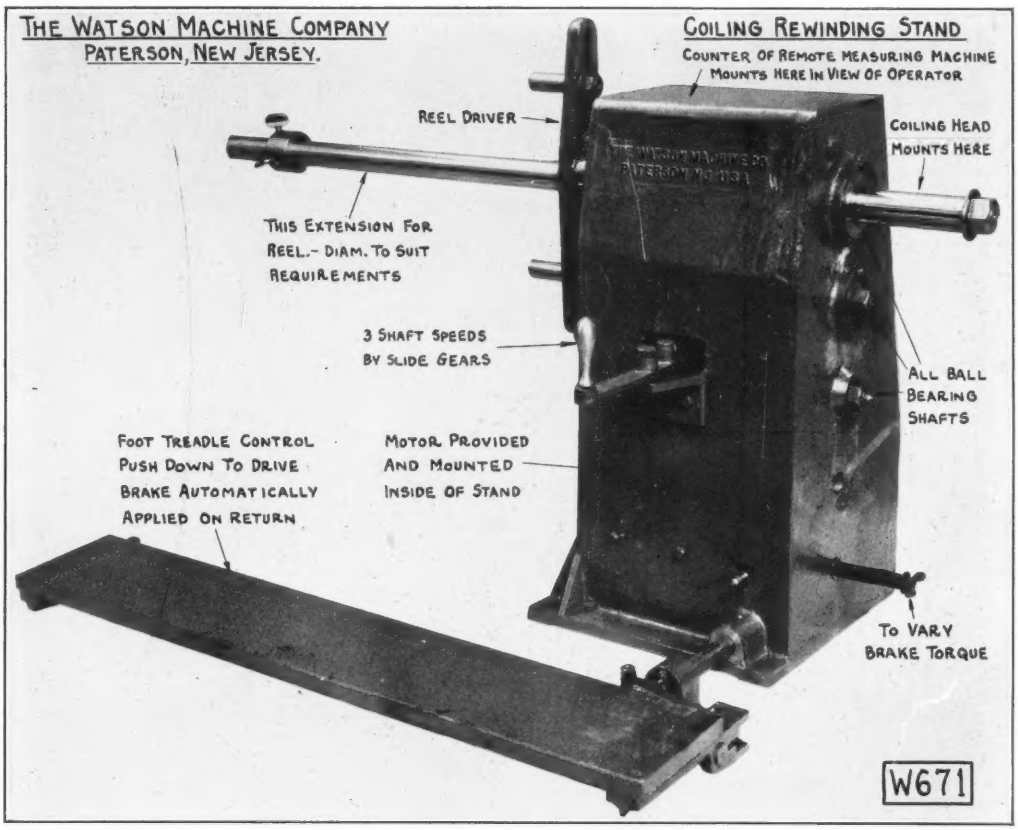
This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

REWINDING-COILING STAND and COILING HEAD


THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY.
COILING REWINDING STAND
COUNTER OF REMOTE MEASURING MACHINE MOUNTS HERE IN VIEW OF OPERATOR
REEL DRIVER
COILING HEAD MOUNTS HERE
THIS EXTENSION FOR REEL.- DIAM. TO SUIT REQUIREMENTS
3 SHAFT SPEEDS BY SLIDE GEARS
ALL BALL BEARING SHAFTS
FOOT TREADLE CONTROL PUSH DOWN TO DRIVE BRAKE AUTOMATICALLY APPLIED ON RETURN
MOTOR PROVIDED AND MOUNTED INSIDE OF STAND
TO VARY BRAKE TORQUE
W671

THIS IS AN IDEAL UNIT FOR SHIPPING ROOM AND WAREHOUSE USE, combining Coiling and Reeling in the minimum of space.

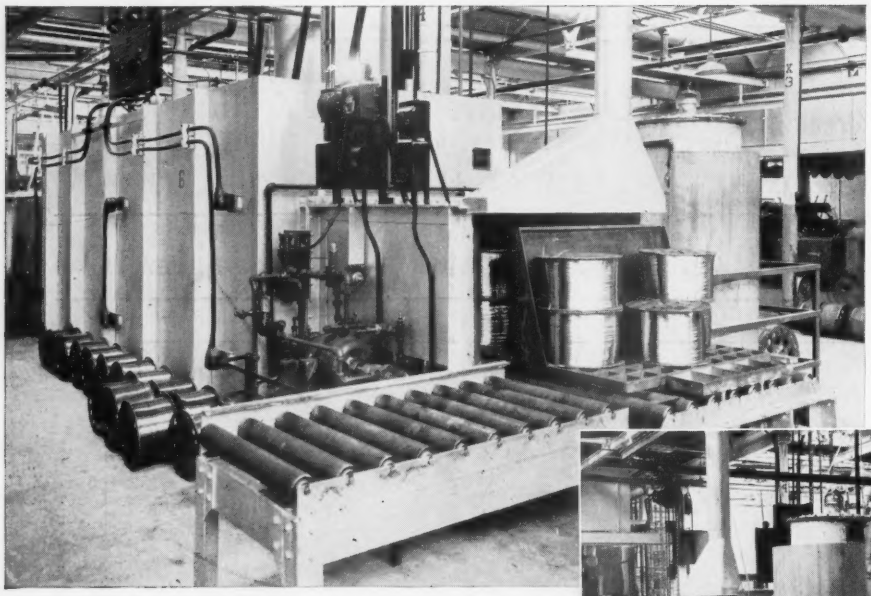
Installation cost reduced to that of wiring to the unit, as motor is provided installed inside of the stand.

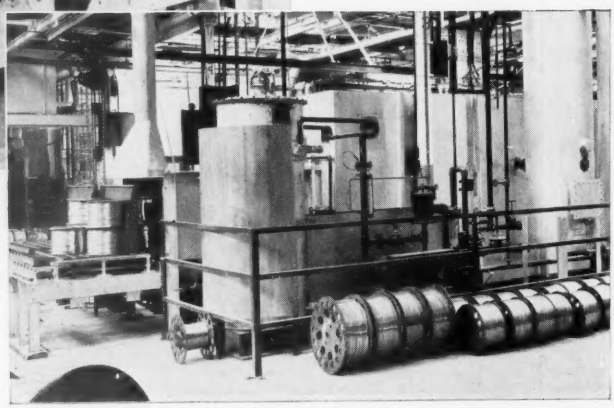
Three speeds are quickly obtained by the slide gear change lever.

Main reel shaft is of heat treated steel, and reels whose weight in pounds multiplied by their overall width in inches does not exceed 75,000, can be carried without outer end support.

All shafts are ball bearing, and gears are cut.

The foot treadle with automatic brake results in an extremely sensitive control, ideally suitable for this operation.





Special Atmosphere
Continuous Furnaces for

Bright Annealing Wire

Uniformly, Economically and Continuously

Wire from the finest gauges to the heaviest sizes is bright annealed uniformly, economically and continuously in special atmosphere furnaces of the type shown above.

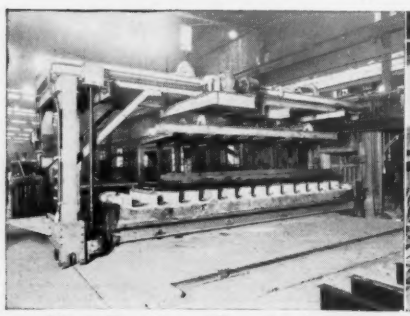
Coiled wire, as well as wire on small spools and large reels, is successfully handled in this equipment. No water seals or vapor of any kind is used, thus staining is entirely eliminated and no drying necessary. The wire is discharged from the furnace uniformly annealed, absolutely bright and dry, ready for shipping, further processing or fabricating. The above is one of several types of electric and fuel-fired furnaces we have developed and built for bright annealing ferrous and non-ferrous wire.

Other recent installations include furnaces for bright and clean annealing brass and copper wire, improved pit type furnaces for normalizing rod and bright annealing steel wire in coils, as well as furnaces for scale-free hardening bolts, springs, etc., billet heating, bright annealing tubing, strip, stampings; carburizing, copper brazing and other heating and heat treating processes.

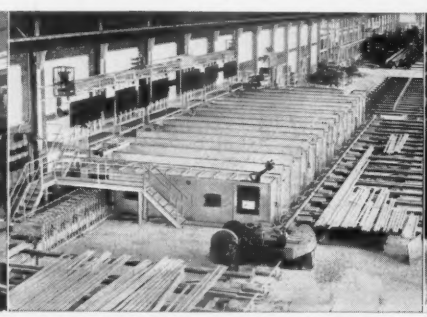
If you are interested in improving the quality of your anneal or heat treatment, increasing production or are contemplating any changes or additions to your furnace equipment, our engineers will be glad to work with you. We specialize on building production furnaces to fit the customer's specific requirements — for any heating process — for any product or production.

The Electric Furnace Co., Salem, Ohio

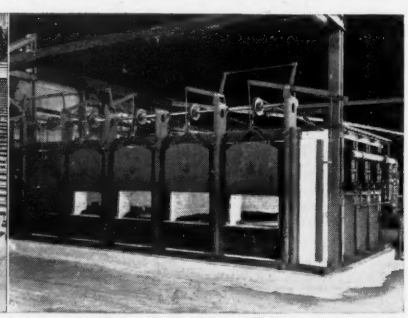
Gas Fired, Oil Fired, and Electric Furnaces—Designed to Fit any Requirement



Heat Treating Alloy Steel Bars
—quench in background



Heat Treating 90 Foot Lengths
—uniformly and continuously



Fuel-Fired Billet Heating Furnaces
—built in any size for oil or gas